Costs and Returns of Grain and Vegetable Crop Production in Nepal's Mid-Western Development Region

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Study conducted in support of **Knowledge-based Integrated Sustainable Agriculture and Nutrition (KISAN) Project**

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Objective

Understanding the costs and benefits of crop production at a local level is necessary to determine locally appropriate agricultural policies. Comparative cost and benefit data for a range of crops gives policymakers the capacity to make more informed recommendations in terms of crop choice and cropping strategies.

While national cost of production estimates exist for a wide range of crops in Nepal, there is sizeable variation in climates, ecosystems, access to land, labor and capital inputs, and access to marketing facilities across and within individual districts. Thus, district and farm-level data is necessary when formulating district-level crop policy.

This study bridges the local-level gap in the data by presenting detailed cost and return figures for the full range of focus crops for the Knowledge-based Integrated Sustainable Agriculture and Nutrition Program (KISAN). Data was derived from a month-long survey of individual farmers (all KISAN beneficiaries) conducted across three districts in Nepal's Mid-Western Development Region during the month of July, 2014. Farm-level results are presented alongside national and district-level estimates for comparative purposes.

Specific study objectives included:

- Design a survey to measure costs and returns of production for KISAN farmers in the Mid-Western Development Region
- During the month of July, 2014, administer the survey to 90 farmers in the Mid-Western districts of Surkhet, Bardiya, and Dang
- Compute average costs of production, revenues, and input prices for KISAN focus crops

Contents

1. Introduction

Located on the Himalayan plateau between China and India, Nepal is a country of sharp contrasts and diverse ecosystems. From the subtropical Terai lowlands characterized by rice cultivation, to hillier regions producing maize, wheat, and millet, the countryside rises rapidly into subarctic conditions near the Tibetan border.[1] Agriculture is a key component of Nepal's economy. Sixty six percent of the country's population is directly employed in agriculture, and nearly 90% live in rural areas.[2] Agricultural activities constitute 38% of Gross Domestic Product.[3]

Despite land reforms implemented in 1964, per capita land holdings remain around 0.14 hectares. While the bottom 44% of agricultural households control 14% of all landholdings, the upper 5% control 27%.[4] Rapid population growth since 1950 drove this holding fragmentation and pushed many hill and mountain farmers onto the Terai plains.[5] More recent urbanization and international migration has depopulated rural areas and left significant land holdings in the hands of women, who nevertheless often lack legal ownership in their husbands' absence.[6]

These factors combine to explain Nepal's high rate of poverty, as well as why Nepal remains a structurally food deficit country.[7] GDP per capita stood at US$700 in 2012[8], and malnutrition affects upwards of 40% of the population.[9] Poverty is highest in rural areas (28.5% versus 7.6% in cities) and is concentrated in the Western and Mid-Western Development regions of the country.[10] Further concerns are arising as the effects of climate change on Nepali farmers become clear. Due to reliance on seasonal rainfalls and to the fragility of mountain and Terai ecosystems, Nepali farmers have suffered from irregular monsoons, flooding, and drought as temperatures rise and weather patterns shift. All of these changes continue to exacerbate food insecurity.[11]

Given the importance of agriculture to Nepal's economy, and the necessity of sustainable and diversified food production to proper nutrition and food security, growth

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[1] Kurokawa, *Introduction to Farming Systems in Nepal, 2002*
[2] IRIN, *Analysis: The trouble with Nepal's agriculture*, 2012
[3] World Bank, World Development Indicators, 2012
[4] Sharma, *Land Tenure and Poverty in Nepal*, 1999
[5] Schroeder, *Himalayan Subsistence Systems: Indigenous Agriculture in Rural Nepal*, 1985
[6] IRIN, *Analysis: The trouble with Nepal's agriculture* , 2012
[7] KISAN Program Statement, USAID, 2013
[8] World Bank, World Development Indicators, 2012
[9] Asian Development Bank, *Sector Assistance Program Evaluation*, 2009
[10] Id.
[11] Gentle, Maraseni, *Climate change adaptation practices by rural mountain communities in Nepal*, 2012

in agricultural productivity is essential to development on a broader scale. Many organizations and programs, including USAID and Winrock International's KISAN program, are working to improve agricultural productivity to increase smallhold farmers' incomes and boost rural livelihoods.

While many Nepali farmers, especially in the Terai region, continue to practice subsistence agriculture focused primarily on rice cultivation, their failure to adapt improved cultivation techniques and higher-value crops does not typically indicate resistance to new practices, but rather lack of access to technical knowledge and assistance. Even with access to organizational support and technical assistance, many farmers will continue with traditional cultivation practices. Nevertheless, data on the average costs and returns for a range of crops in their district could help farmers make more informed production decisions. For organizations formulating policies related to farmers' crop selection and production strategies, this data is also essential.

This report satisfies this need by providing data on costs and returns of production across a range of subsistence and high-value crops at the national, district, and farm levels. The report should enable the KISAN program to better formulate policies related to crop selection, investment in land, labor, and capital inputs, and marketing.

2. Overview of KISAN Project

The Knowledge-based Integrated Sustainable Agriculture and Nutrition Project (KISAN) is a five-year USAID project in Nepal designed to increase agricultural productivity and improve rural livelihoods. Nepal was one of 19 countries selected to be part of the United States' Presidential Feed the Future Initiative, a global effort to improve food security in developing countries.[12]

The KISAN project works closely with the Government of Nepal's Ministry of Agricultural Development and Ministry of Health and Population, as well as with an array of public and private stakeholders that include farmers, NGOs, research institutions, private businesses

Project Objectives include:

- "Improve the quality and availability of agro-inputs like seeds, fertilizers, and credit for farmers.
- Improve the capacity of agriculture extension workers, service providers, and farmers to deliver services more efficiently.
- Facilitate improved and sustainable agriculture production practices and technologies including production of nutritiously diverse vegetables, fruits and backyard poultry, and application of post-harvest technologies and practices at the farm level.
- Improve market efficiency and farmer access to markets.
- Increase the capacity of the Government of Nepal and Nepali organizations to solicit and implement development projects."

Planned Outcomes include:

- "Train approximately 160,000 households in improved and sustainable agriculture production and post-harvest technologies and practices
- Ensure sustainable agriculture production and post-harvest technologies and practices adopted at farm level in at least 45,000 hectares of land.
- Strengthen the capacity of 200,000 agricultural extension workers and service providers"

The KISAN program organizes farmers' groups as the village level. Group members attend trainings in the following areas:

[12] All information in this section is derived from KISAN Program Statement, USAID, 2013

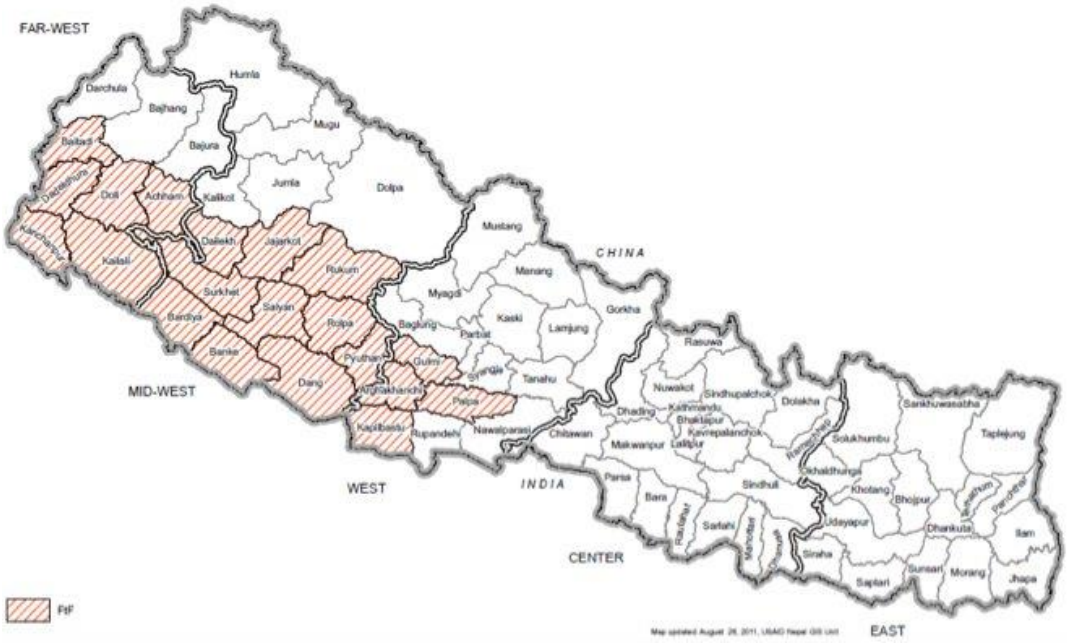
- Nursery Management
- Planting Techniques
- Seed Varieties
- Chemical Fertilizer
- Barnyard Management
- Jhol-Mol
- Pest Management (IPM)
- Plastic Houses/Drip Irrigation
- Rhizobium Culture
- Post-Harvest Management

Trainings involve both classroom and practical components. Local community members and operators of agricultural supply shops (agrovets) are simultaneously trained in these techniques. These community members become Local Service Providers (LSPs). LSPs continue trainings and community outreach after the KISAN program transitions out of that farmers' group. LSPs ensure sustainability by building a local base to continue with KISAN knowledge transfer.

The KISAN program operates in the Mid-Western and Far-Western Development Regions of Nepal (see map below). These regions are characterized by lower levels of development and higher levels of food insecurity and malnutrition than what is found in the rest of the country.

Figure 1.

Map of Nepal; Orange-colored areas are KISAN project Districts



Map Credit: USAID Feed the Future Initiative Nepal

3. Survey Administration and Methodology

The survey (see **Survey Appendices**) decomposes costs of production into labor costs, capital costs, costs of credit, opportunity costs of land, and opportunity costs of investment. The survey also collected general demographic and geographic information. **The survey measures costs of one crop for one growing season. Thus, all numbers given in the Results section for "Costs of Production" refer to the cost to produce one harvest of one crop.**

- Labor costs include all payments to hired farm laborers, as well as the wage-value of all family and unpaid neighbors' labor that was invested in the production of the focus crop for that season. The valuation of unpaid labor is discussed in **Section 3.1** below.
- Capital costs include the costs of all capital inputs for the production of one season of the focus crop. The process of valuing these inputs is discussed in greater detail in **Section 3.2** below.
- Cost of credit was measured as the cost of interest for the part of a farmer's loan going towards the target crop. Details are given in **Section 3.3**.
- Opportunity Costs of Land and Investment are further discussed in **Section 3.4**

3.1 Pricing Unpaid Farm Labor

The cost of hired labor is easily calculated. Total hours of hired labor are multiplied by the local market wage to find total cost of hired labor. Farmers in Mid-Western Nepal, however, rarely hire labor. Most rely on unpaid labor from themselves, their own families, or unpaid neighbors. Communities often pool labor during periods of planting and harvest, and one neighbor's day of labor on the farmer's farm is repaid by that farmer's labor on her neighbor's farm.

A sizeable body of literature exists on the pricing of unpaid farm labor. It suggests that assigning a market wage to this labor will overstimate the value of unpaid farm labor, because farmers tend to "self-exploit" and work beyond the point at which the marginal returns of their labor equal the marginal costs.[13] Because many farmers have very little opportunity cost to their time, they work for long hours on their farms, even though the value they are creating in these hours may be very low. Thus, assigning a market wage to these hours would drastically overestimate the true cost of production.

[13] Huffman, Wallace, *Farm Labor: Key Conceptual and Measurement Issues on the Route to Better Farm Cost and Return Estimates*, Staff Paper #280, Iowa State University, 1996

Furthermore, the labor investment in a family farm's crop production may involve diverse labor inputs: men, women, and childrens' labor, as well as highly trained and untrained labor. Again, assigning a single wage to labor irrespective of gender, age, and training, ignores the complexity of agricultural practice.

The real cost of a farmer's unpaid farm labor is the opportunity cost of her off-farm employment, that is, what they could earn if they reallocated their farm-labor time to outside employment. Or, perhaps more accurately in small village settings (such as that of the Mid-Western Development Region) where off-farm employment opportunities are nearly nonexistent, the real cost of the farmer's labor is the opportunity cost of her leisure.[14] Putting a numerical value on how much each farmer values his or her leisure time is, of course, unfeasible. However, a measure of off-farm opportunity cost can be constructed. As suggested in El-Osta and Ahearn 1996, the opportunity cost of off-farm employment is often a factor of human capital variables.[15] Age, gender, level of education, and level of agricultural training all determine the wage that could be received off-farm. And while this adjusted wage cannot apply to all farmers in the MWDR because labor markets are nonexistent in some areas, it offers a better approximation than other available methods.

This study constructed a weighted wage that adjusts the local market wage according to the individual farmer's level of human capital. The human capital variables considered were Age, Education, Number of Agricultural Trainings (primarily KISAN trainings) attended, and Gender.

Education was considered the most determinative variable. Many farmers in the survey area are illiterate, while others possess higher education beyond secondary school. Those with more education clearly have wider off-farm employment opportunities.

The next most important variable was considered to be Number of Agricultural Trainings. Farmers with knowledge of high-value vegetable cultivation, mechanized inputs, chemical fertilizer and pesticide, and nursery or seed techniques, have valuable skill sets that could confer upon them higher earning potential.

[14] Huffman, Wallace, Farm Labor: Key Conceptual and Measurement Issues on the Route to Better Farm Cost and Return Estimates, Staff Paper #280, Iowa State University, 1996
[15] El-Osta, Hisham and Ahearn, Mary, Estimating the Opportunity Cost of Unpaid Farm Labor for US Farm Operators, USDA 1996

Thirdly, Age is a decisive variable because agricultural labor in the region is physically demanding. Bending over, repetitive motions, heavy lifting, and high temperatures all mean that older laborers would be less productive than younger ones, and could thus command a lower off-farm labor wage. Furthermore, very young laborers (considered here as those under 20 years old) are less experienced, and may thus require more supervision.

Finally, gender is determinative in off-farm earning capacity because the regional average market wage for men is around 300 NRs per day, while for women it is around 200-250 NRs per day.

The relative importance of these four variables is encapsulated in **Equation 1**:

Equation 1.

Adjusted Wage = Local Market Wage *((0.2*Age)+(0.4*Education)+

(0.25*Agro. Trainings)+(0.15*Gender))

Equation 1 decomposes the local market wage into Age, Education, Agro. Trainings, and Gender components. If values of 1 were input for Age, Education, Agro. Trainings, and Gender, the equation would simply return the local market wage. If, instead of 1, the weighted values given in Table 1 are insterted, the local market wage will be depressed to a new, adjusted wage that accounts for the farmer's level of human capital.

Table 1.

Education:	
Illiterate	0.6
Informal Literacy	0.7
Primary (1-5)	0.7
Secondary (6-10)	0.8
SLC	0.9
Higher	1.0

Age:	
<20 yrs.	0.8
20-45 yrs.	1.0
45-65 yrs.	0.7
>65 yrs.	0.5

Agro. Trainings	
0 Trainings	0.6
1-2 Trainings	0.7
3-4 Trainings	0.8
5-6 Trainings	0.9
7-9 Trainings	1.0

Gender:	
Male	1.0
Female	0.8

These values are arrived at arbitrarily, but can be calibrated using an alternative method of calculating value of unpaid labor. This is the "consumption method." In subsistence agricultural practices, many laborers may not receive a wage, but are instead paid "in kind." They receive the value of their labor as a

portion of the final harvest into which their labor was invested. Even farmers' children in a sense receive a payment in kind for their labor on the farm, in the form of their food allotment. Thus, measuring the value of the crop production consumed by the laborer gives the value of that worker's labor.

The problem with this approach is that calculating the value of consumption is possible only when data exists for all the crops grown on the farm. The current study focuses on just one crop per farmer. Thus, calculating the value of tomatos consumed by the farmer would be relatively simple:

Equation 2.

(Total Tomato Yield – Volume of Tomatoes Sold) = Total Volume Tomatoes Consumed

(Total Volume Tomatoes Consumed) / (Number of Family Members) = Tomato Consumption per Family Member

(Tomato Consumption per Family Member)*Market Tomato Price = Value of Tomato Consumption

This seasonal value could be further decomposed into a daily wage.

Nevertheless, this value cannot capture the value of consumption of other crops, and is therefore not a valid estimation. There are, however, situations in which the survey was able to measure the crop production for an entire farm. These are the cases in which the farmer was growing a single crop (usually rice) on all of her land. In these cases, the average consumption (when converted to daily wage) amounts to around 241 NRs per day. Using this approximate benchmark value, the weightings in Table 1 can be calibrated to approximate 241 NRs. With the given weightings, the average adjusted wage for all survey data is 250.2 NRs per day. It is to be expected that the adjusted wage be slightly higher than the consumption value for the rice growers, since these 100% rice cultivation farms often represent the lowest value farms in their communities.

3.2 Depreciating Capital Costs

Capital inputs measured in the study include:

- Tractor
- Motor Tiller
- Thresher
- Plow Animal
- Motor Pump
- Water Tanks
- Irrigation Canals
- Sprinklers
- Hoses
- Pesticide

- Jhol Mol
- Manure
- Chemical Fertilizers
- Seeds
- Transportation (Bus, Truck)
- Plastic Houses/Bamboo Structures

Major capital inputs such as tractors, tillers, and pumps often last for more than one season. Since the study seeks to measure costs of production for a single crop for a single season, these long term capital inputs must be depreciated. Long-term capital inputs were considered to be: Tractors, Motor Tillers, Threshers, Motor Pumps, Hoses, and Plastic Houses. The single season, single crop value is calculated as:

Equation 3.

Single Season/Single crop value of long-term capital input =

(Initial Cost of Input)/(Estimated life-span of input)/(Proportion of total landholding dedicated to target crop*)/(# of seasons that field can be planted)

*If the crop does not involve the use of that capital input, the assessed cost would be zero, even if the the farmer owns the input and uses it on other parts of her farm.

Further accounting must be made for **byproduct incomes**. Many farmers use significant amounts of manure and jhol mol (a formulation of livestock urine used as fertilzer and biopesticide) on their fields, which we assess at a cost of between 35 and 50 NRs per doka (a unit of measurement referring to a traditional basket, typically holding about 10 kilograms of manure). Nevertheless, the farmers feed these livestock on byproducts from their crop production. Thus, crop byproduct value cancels out the cost of jhol mol and manure. The study accounts for this by reducing jhol mol and manure costs for those farmers growing crops with useable byproducts.

3.3 Costs of Credit

Many farmers in the region have taken out loans to cover costs of crop production. Interest rates average 13%, and costs of credit can be significant for some farmers. Costs of credit are assessed according to the following formula:

Equation 4.

Cost of Credit = (Amount of Loan*Duration of Loan*Interest Rate) / (Number of Seasons Focus Crop is Planted per year)

Note: Amount of Loan is itself adjusted. Farmers report total loan amount, and detail for which crops the loan is used. Surveyers calculated the proportion of the total loan value that went toward the specific focus crop of the survey. This reduced value is the value entered as "Amount of Loan" in the above equation.

3.4 Opportunity Costs of Land and Investment

In some communities in the MWDR most farmers own their own land and there is a very limited or non-existent rental market for land. In these communities, the opportunity cost of land leasing may be very low, or even zero. However, in communities in which at least one farmer reported leasing land, this study assesses opportunity costs of land as the per ropani lease price of land multiplied by the number of ropanis of the focus crop under cultivation.

While opportunities for non-farm investment are admitedly very low in many areas of the MWDR, farmers do have the ability to take the money they invest in the labor and capital inputs of crop production and invest instaed in business activities, migration, or mechanized inputs for rental, among other options. In some cases, formal financial investment opportunities do exist. This study assess the opportunity cost of investment as 5% of all labor and capital expenditures.

3.5 Survey Administration and Participant Selection

Surveys were administered individually to 83 farmers across 13 Village Development Committees (VDCs) in the Mid-Western Districs of Surkhet, Bardiya, and Dang. The district of Surkhet is in the Mid-Hills region, whereas Bardiya and parts of Dang belong to the Terai lowlands. Together, these three districts offered a representative sample of ecosystems and agricultural systems in the Mid-Western Development Region.

Survey participants were all beneficiaries of the KISAN program. However, their degree of involvement in KISAN varied significantly, and this variable can be controlled for in regression analysis. Further, most farmers reported data from before KISAN initiation, which may thus be treated as background data. From KISAN farmers groups, survey participants were selected randomly.

Figure 2.

Districts of KISAN Activity in Nepal; Surveyed Districts Outlined in Black

Each survey was administered individually to a farmer, and surveyers chose which of that farmer's crops would be discussed at the time of the survey. Data from the surveys were used to calculate average costs and returns, among other variables, both for each district individually and across all districts as a whole. Average values for Surkhet, Bardiya, and Dang together are assumed to constitute average values for the MWDR as a whole.

Key results were calculated using the formulas below:

(Note: The ropani is one of the traditional land units of Nepal. One ropani is equal to approximately 0.051 hectares. Ropani are used throughout this report because they are the unit of reference in Nepali agriculture, and because they provide smaller values than per hectare terms. Given the small size of Nepali farmers, the ropani simply makes more sense)

Equation 5.

Labor Cost Per Ropani = Total cost of paid and unpaid labor (at adjusted unpaid labor wage) / ropani under cultivation

Equation 6.

Capital Cost per Ropani = Total cost of all capital inputs (with long-term inputs depreciated) / ropani under cultivation

Equation 7.

Total Cost per Ropani = Total labor and capital costs / ropani under cultivation

Equation 8.

Total Cost per kg. = Total labor and capital costs / number of kilograms produced

Equation 9.

Revenue per Ropani = (Total kilograms produced)*(Retail price per kilogram) / ropani under cultivation

Equation 10.

Net Profit per Ropani = (Total Revenue per ropani – Total Cost per ropani) / ropani under cultivation

Equation 11.

Cost of Land Preparation = ((Hours of paid and unpaid labor invested in the stage of Land Preparation)*(Adjusted wage)) + Tractor Cost + Motor Tiller Cost + Plough Animal Cost + Plastic Houses Cost

Equation 12.

Cost of Planting = ((Hours of paid and unpaid labor invested in the stage of Planting)*(Adjusted wage)) + Seed Cost

Equation 13.

Cost of Land Maintenance = ((Hours of paid and unpaid labor invested in the stage of Land Maintenance)*(Adjusted wage)) + Pesticide Cost + Jhol Mol/Manure Cost + Chemical Fertilizer Cost + Hoses Cost + Sprinklers Cost + Water Tanks Cost

Equation 14.

Cost of Harvest **=** ((Hours of paid and unpaid labor invested in the stage of Harvest)*(Adjusted wage)) + Thresher Cost

Equation 15.

Cost of Post-Harvest = ((Hours of paid and unpaid labor invested in the stage of Post-Harvest)*(Adjusted wage)) + Transportation Cost

4. Scope and Limitations of Study

Agricultural production is a highly complex process involving myriad variables and variations. The task of arriving at estimations of cost and return is thus necessarily a balancing act between pushing for ever more detail, which requires more time per survey, and larger sample sizes. This study performed that balancing act by avoiding unnecessary details and retaining its focus on one task: the calculation of costs and returns to crop production. To this end, the study does not venture beyond the initial point of sale, that is, where the farmer sells her crop to the first retailer. Marketing costs and earnings are beyond the scope of the study. We are concerned here with the immediate costs and returns to the farmer of producing a variety of crops in the Mid-Western Development Region.

When evaluating the data that follow, a number of considerations should be made:

- **Sample Size**: The survey sought to measure costs and returns to the production of ten different crops. In doing so, the sample sizes for some of the individual crops was inevitably low. Numbers should be considered in light of the fact that some averages may only be reflecting a few samples. The skewing effects of outliers have, however, been accounted for in all reported data through removal of statistical outliers.

- **Estimation Error**: The principal errors introduced into the data set are estimation errors by survey respondents. Many farmers found it difficult to give exact numerical estimates for values such as yield, farm size, prices, and input costs. Farmers in the region are often illiterate or have only primary school educations. While their agricultural practice is admirably well-organized, they may not be accustomed to answering detailed numerical questions. Because of this, many farmers overestimated the labor investment in their fields, and underestimated key output values like yield. Yield was especially difficult to estimate for farmers growing crops with multiple harvest periods. For crops like tomatoes, for example, farmers harvest a few kilograms each day for many days. The act of totaling the value of all these small harvests often resulted in underestimation.

- **Seasonal Variation**: Large differences in yield, labor investment, irrigation investment, and most decisively, retail price, exist between different growing seasons in this region. At times even a few days difference can result in dramatically different retail prices for some high-value vegetable crops. Thus, the season for which the farmer chose to report his or her results could have an effect on whether or not those results were profitable or otherwise.

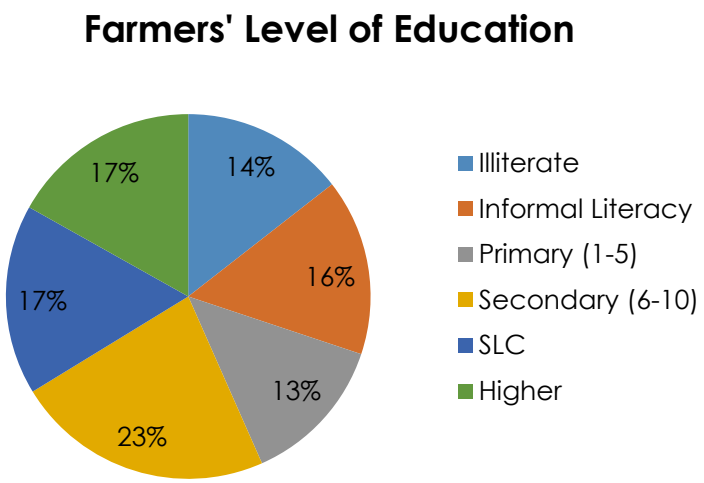
- **Season of Reported Crop**: One key fact to consider is that **this survey was conducted very early in the implementation of the KISAN program. Because of this, most farmers reported data from the season before their KISAN trainings began. In this sense, this data represents baseline data, rather than an evaluation of costs and returns with KISAN trainings.**

- **KISAN Experience**: Many survey respondents had not yet had any KISAN trainings, or were not yet actively implementing their trainings. Again, this suggests that **the data in this study should be regarded as baseline data rather than a reflection on the efficacy of the KISAN trainings.**

5. Background Data on Survey Participants

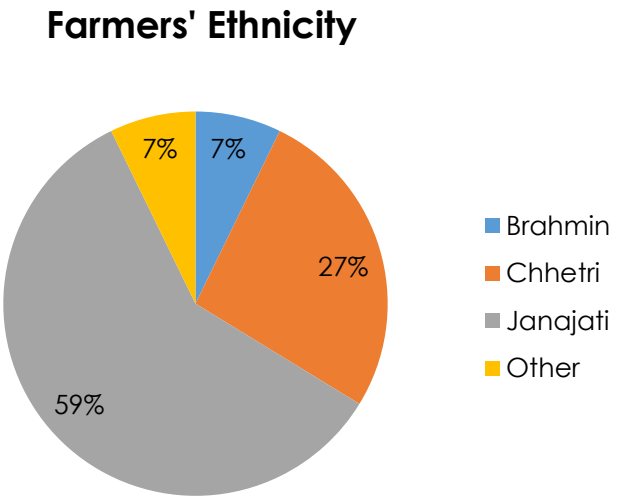
The survey included demographic and geographic information, as well as detailed information on costs and returns. This geographic and demographic data can help paint a fuller picture of farmers and farming practice in the Mid-Western Development Region, as well as a better understanding of the type of farmer participating in the KISAN program.

Figure 3.



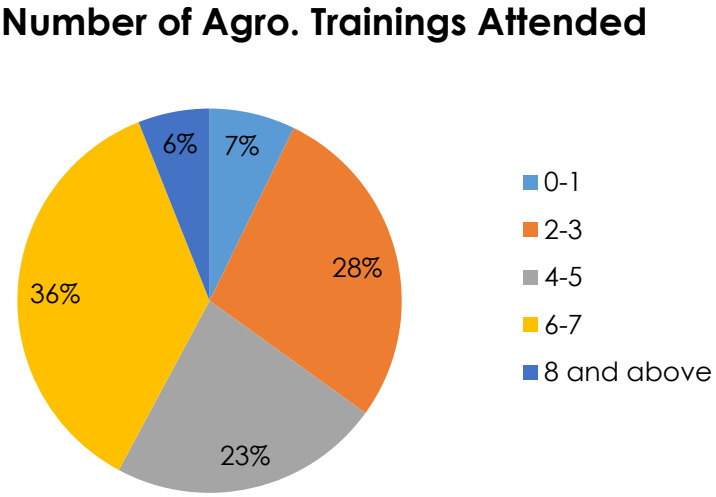
Farmers in the MWDR possess diverse levels of education. Many are illiterate, while some hold SLCs and higher degrees.

Figure 4.



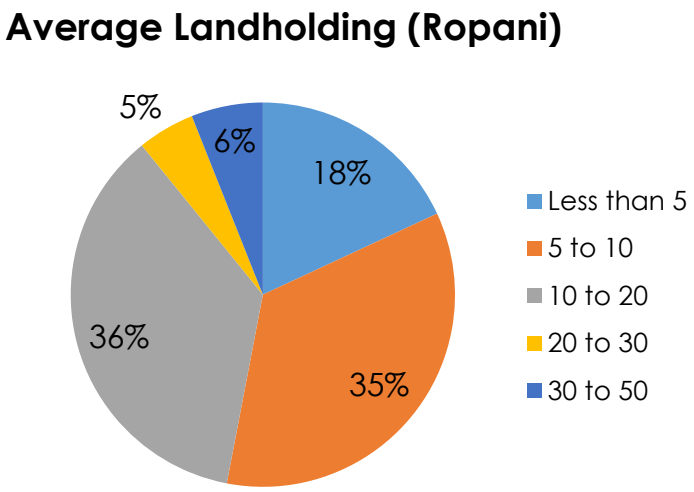
Farmers across Surkhet, Bardiya, and Dang are primarily Janajati. Many of these Janajati are Tharu, and speak Tharu as their first language.

Figure 5.



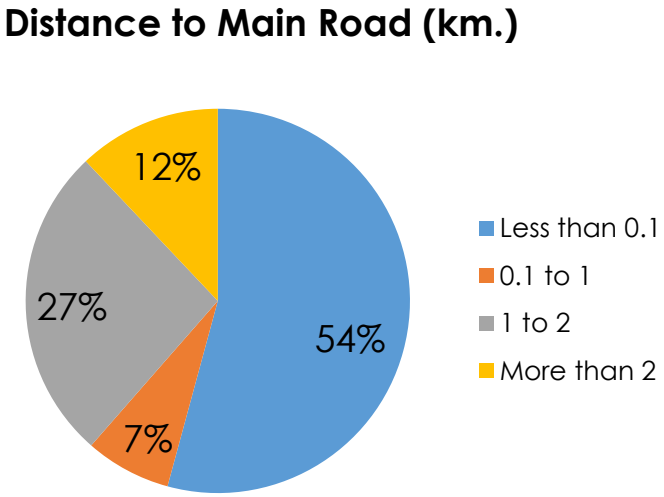
Farmers reported the number of KISAN or other agricultural training sessions that they had attended. While it is only possible to attend six KISAN trainings, farmers may have reported more than six because they confused classroom and practical trainings as separate trainings, because they went to another farmers' group's trainings as well as their own, or they went to trainings by an organization besides KISAN. Figure 5 shows that 93% of farmers have attended at least two trainings, while 65% have attended four or more.

Figure 6.



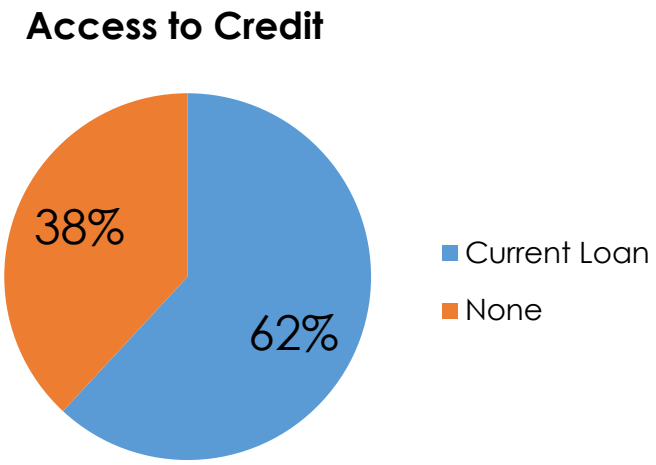
35% of farmers own between five and ten ropani of land, that is between 0.25 and 0.50 hectares. Another 36% hold between 10 and twenty ropani, that is, between 0.50 and 1.0 hectares. Few farmers have landholdings larger than one hectare.

Figure 7.



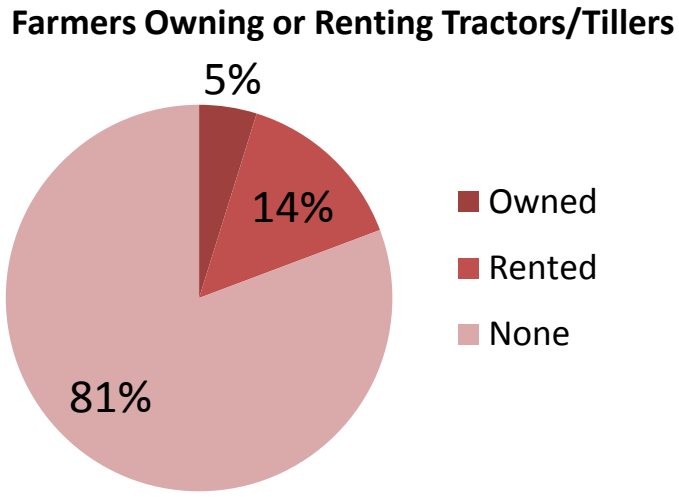
When asked the distance from their farm to the nearest road, nearly all farmers reported living right on the road. Specifying "road" as main road or road with bus service allowed surveyors to standardize reporting. Many farmers interviewed lived near to a main road, while 39% of respondents lived more than 1 kilometer from a drive-able road.

Figure 8.



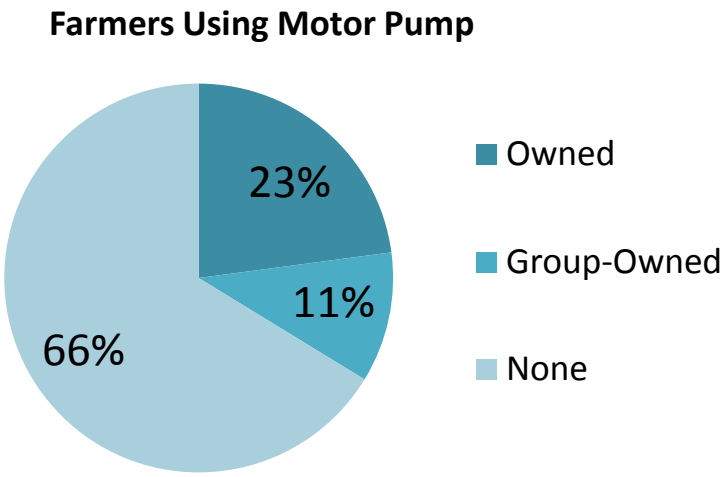
Many farmers interviewed held loans. Those who did not hold loans reported being unaware of loan opportunities, or explained that they did not require a loan at the time. Many interest rates were surprisingly high, (averaging 18%) suggesting possible loan profiteering by lenders.

Figure 9.



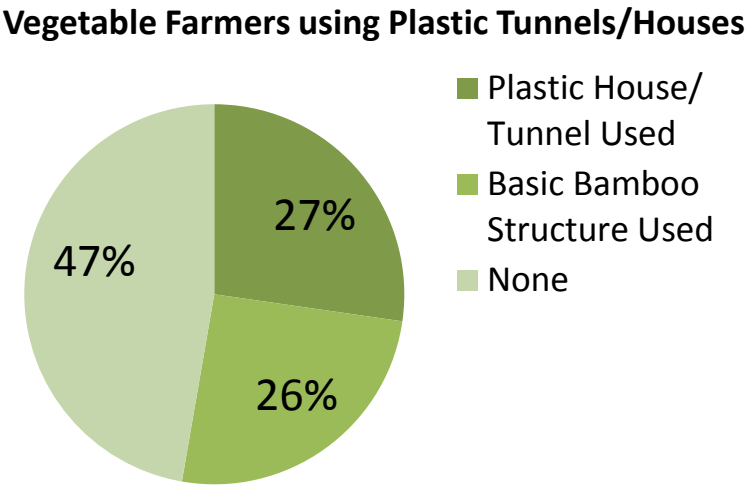
Most farmers were unable to make the investment in a tractor or tiller. 14% of farmers had rented, often from a neighboring community member who purchased the tractor and made secondary income from rental. Only 5% of farmers surveyed personally owned a tractor.

Figure 10.



Only 34% of respondents used a motorized pump of any kind, despite grave irrigation challenges. Many farmers identified lack of a pump as their primary challenge to production. 23% of farmers owned a pump, while another 11% had purchased a pump as a community and shared its use.

Figure 11.

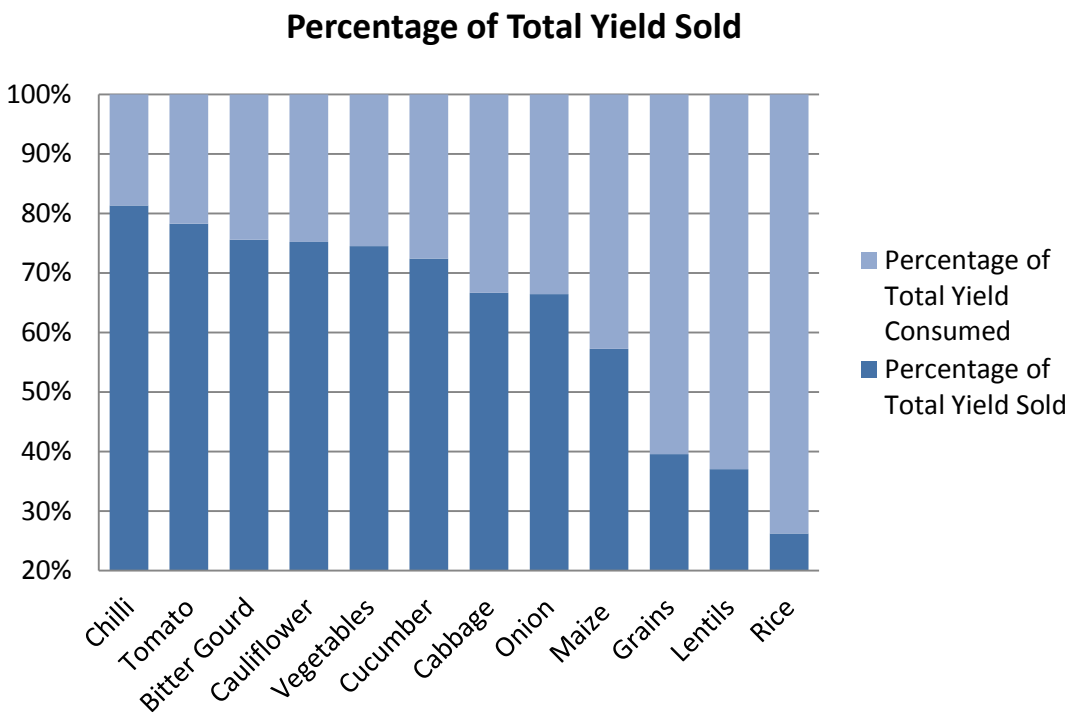


Of all vegetable farmers, approximately half were using improved bamboo structures of some kind. 27% were using fully-constructed plastic houses or tunnels.

Market Integration

Many farmers in the MWDR continue to grow primarily subsistence crops such as rice, maize, and lentils. These crops are often not sold at market. Programs such as KISAN, however, are pushing to capitalize on the regions off-season advantage to produce higher-value vegetable crops to be sold at market. This push for commercialization is intended to boost incomes for local farmers and diversify food production. **Figure 12** below shows that vegetable crops are indeed more commercialized than subsistence grain crops such as lentils, maize, and rice.

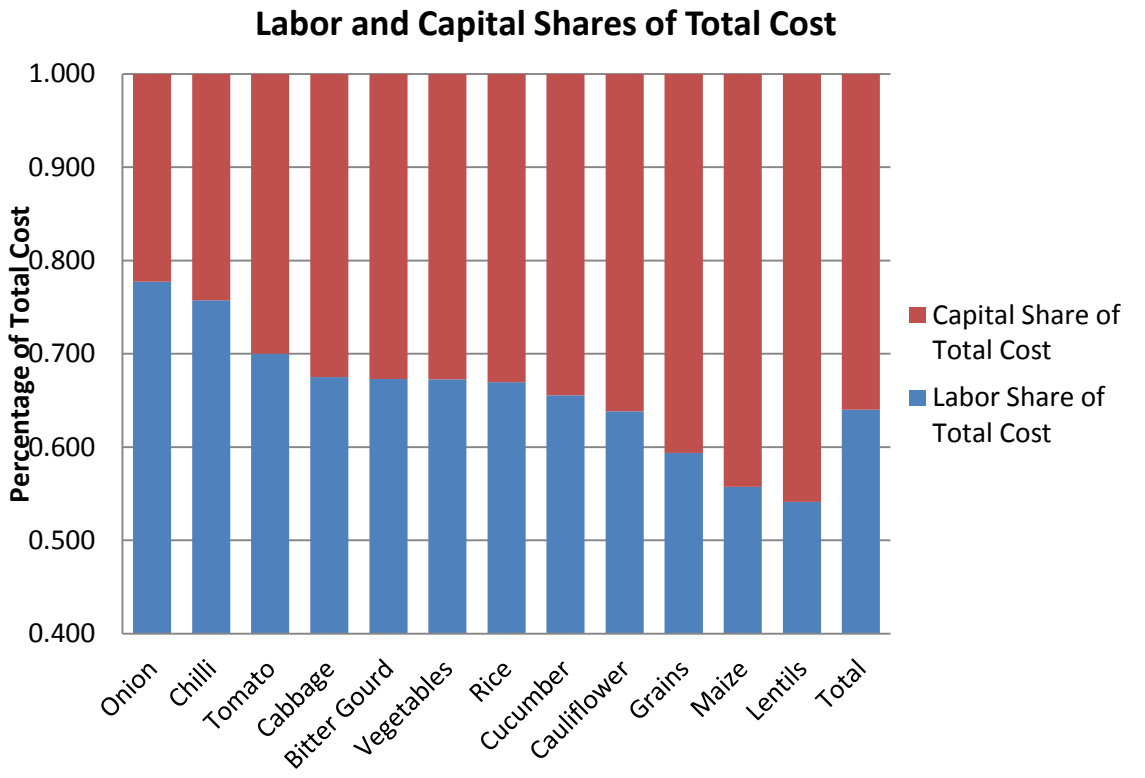
Figure 12.



Allocation of Labor and Capital

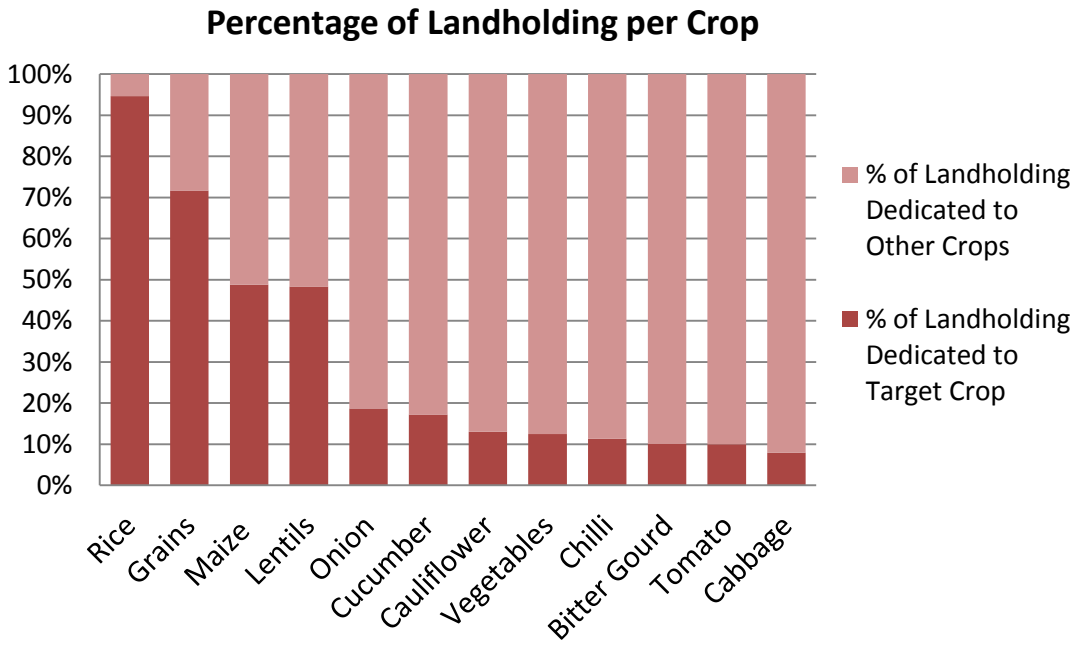
It does not seem initially self-evident that vegetable crops would be more labor intensive than grain crops. Cultivation of tomatoes and cucumbers, for example, requires the use of expensive plastic houses and tunnels. Nevertheless, as shown in **Figure 13**, vegetables are notably more labor intensive than grains. This is largely because grain crops require more intensive land preparation such as ploughing and tilling.

Figure 13.



Proportion of Farm Committed to Crop

Figure 14.



Farmers typically grow rice on the majority of their land, and grow commercial vegetables on only a small plot. As illustrated in **Figure 14** above, grains remain the staple crop for most farmers, while vegetables are a specialty item. Few farmers are dedicating their entire landholdings to commercial crop production.

6. Results

Results are presented for the country as a whole, for each of the three surveyed districts, and for the aggregated results of individual surveys with farmers. Country level data is presented first, then district data, then farm-survey level data. Variation in the data is expected, given variation in climate and ecosystem, cropping practices, season for which data was reported, farmer estimation variance, and survey methodology.

6.1 Country-level Estimates of Costs and Returns of Production

National estimates for costs and returns of production are available for a range of grain and vegetable crops. The national surveys were conducted across a range of districts, seasons, and irrigated and unirrigated fields. Results presented here were calculated from that survey by averaging values for irrigated and unirrigated cultivation. Results were taken from those districts with available data that were nearest to Surkhet, Bardiya, and Dang.

Figure 15.

National Estimates						
	Labor Hours per Ropani	Labor Cost per Ropani (NRs)	Total Cost per Ropani (NRs)	Cost per kg. (NRs)	Revenue per Ropani (NRs)	Net profit per Ropani (NRs)
Tomato	99	2941	4487	4.5	16146	11659
Cauliflower	111	4901	6926	7.2	14941	8015
Bitter Gourd	61	2272	4092	4.9	19281	15189
Cabbage	93	3789	5527	4.4	15467	9940
Onion	73	2481	3924	4.0	12374	8450
Chilli	92	3317	5388	5.3	18242	12852
Maize	48	1491	2401	13.6	2678	277
Rice	54	1944	2853	14.2	3122	274

From "COST OF PRODUCTION & MARKETING MARGIN OF CEREAL,CASH, VEGETABLE & SPICES CROPS, NEPAL," Market Research and Statistics Management Program, Government of Nepal, Ministry of Agriculture, 2013.

6.2 District-level Estimates of Costs and Returns of Production

The District-level estimates given below are derived from estimates made by KISAN staff in the three district locations. Thus, these numbers are not directly derived from field surveys, and should be treated with due consideration. The district staff work in the field at the village level on a daily basis, and are well equipped to make accurate estimates. Again, the variation between these three sets of district estimates should be noted.

Figure 16.

Surkhet						
	Labor Hours per Ropani	Total Cost per Ropani (NRs)	Retail Price per kg. (NRs)	Revenue per Ropani (NRs)	Net profit per Ropani (NRs)	Yield per Ropani (kg.)
Tomato	172	14350	25	55000	40650	2200
Cauliflower	88	6850	30	30000	23150	1000
Cucumber	108	8320	18	36000	27680	2000
Bitter Gourd	108	8860	30	22500	13640	750
Cabbage	96	7100	17	34000	26900	2000
Onion	128	8295	25	37500	29205	1500
Chile	112	7575	30	30000	22425	1000
Maize	96	4835	32	4352	-483	136
Lentils	56	3250	110	3850	600	35
Rice	64	5252	40	6240	988	156

Figure 17.

Bardiya						
	Labor Hours per Ropani	Total Cost per Ropani (NRs)	Retail Price per kg. (NRs)	Revenue per Ropani (NRs)	Net profit per Ropani (NRs)	Yield per Ropani (kg.)
Tomato	120	12000	15	37500	25500	2500
Cauliflower	96	9000	25	23750	14750	950
Cucumber	96	9000	15	37500	28500	2500
Bitter Gourd	80	7500	15	52500	45000	3500
Cabbage	96	9000	15	14250	5250	950
Onion	144	7231	12	16769	9538	2000
Chile	144	6550	20	5450	-1100	600
Maize	64	7000	10	15000	8000	1500
Lentils	64	4000	80	5600	1600	70
Rice	64	4000	12	14400	10400	1200

Figure 18.

Dang						
	Labor Hours per Ropani	Total Cost per Ropani (NRs)	Retail Price per kg. (NRs)	Revenue per Ropani (NRs)	Net profit per Ropani (NRs)	Yield per Ropani (kg.)
Tomato	120	12000	15	37500	25500	2500
Cauliflower	96	9000	25	23750	14750	950
Cucumber	96	9000	15	37500	28500	2500
Bitter Gourd	80	7500	15	52500	45000	3500
Cabbage	96	9000	15	14250	5250	950
Onion	80	7500	30	36000	28500	1200
Chile	120	12000	20	50000	38000	2500
Maize	64	7000	10	15000	8000	1500
Lentils	64	4000	80	5600	1600	70
Rice	64	4000	12	14400	10400	1200

6.3 Survey Results of Costs and Returns of Production

Survey results are presented in **Figure 19** below. Results are disaggregated by crop and by district. Data is reported for all crops in which there was a sample size of at least two for that district. Where there was only one sample of a crop for the district, that value is still used in Region-wide estimates, but is not reported for the individual district. The data presented here has been treated to remove statistical outliers.

Data was collected in the districts of Surkhet, Bardiya, and Dang. These three districts may be considered representative of the various ecosystems and farming systems within the Mid-Western Development Region as a whole. Thus, average cost and returns values for these three districts are treated as average values for the district as a whole, and are reported as values for the "MWDR."

In-depth explanation of the formulas used to arrive at the data values given in **Figure 19** is provided **Section 3.5.**

Figure 19.

		Survey Estimates								
		Labor Hours per Ropani	Labor Cost per Ropani (NRs)	Capital Cost per Ropani (NRs)	Total Cost per Ropani (NRs)	Total Cost per kg. (NRs)	Retail Price per kg. (NRs)	Revenue per Ropani (NRs)	Net profit per Ropani (NRs)	Yield per Ropani (kg.)
Surkhet	Tomato	155	5299	2039	7749	16	22	10782	3033	493
	Onion	327	11046	4194	16126	21	38	31450	15324	830
	Chilli	504	15085	3365	20380	41	43	21619	1240	519
	Maize	31	1161	1362	2670	23	20	2199	-471	110
	Rice	91	2855	1304	4452	15	20	5908	1456	305
Bardiya	Cucumber	69	2081	3098	6140	15	22	10733	4593	502
	Bitter Gourd	244	6676	3002	10229	13	38	42792	32563	1013
	Onion	311	10252	3155	14817	39	63	28618	13801	595
	Maize	35	1266	1102	2601	19	19	3747	1146	193
	Rice	50	1448	995	2612	16	20	3420	808	170
Dang	Tomato	308	9460	4080	15496	20	28	30546	15050	844
	Cauliflower	110	5067	3247	9051	15	37	24276	15225	663
	Cucumber	261	8704	3790	13363	23	24	17167	3804	727
	Bitter Gourd	169	5488	3863	10404	23	43	24403	14000	636
	Cabbage	231	7358	5197	14436	18	20	15628	1193	843
	Maize	23	1031	1114	2734	17	20	3189	455	159
	Lentils	41	1346	2265	3800	76	60	3231	-569	54
	Rice	210	5306	1773	8424	26	20	5933	-2491	292
MWDR	Tomato	235	7815	3499	12537	21	28	21275	8738	657
	Cauliflower	128	5689	3085	9592	15	38	28308	18715	719
	Cucumber	781	26353	13268	41975	23	27	43559	1584	1580
	Bitter Gourd	633	18752	8909	29380	20	41	61157	31777	1496
	Cabbage	231	7358	5197	14436	18	20	15628	1193	843
	Onion	294	9639	3254	13909	29	47	26126	12217	630
	Chile	376	11155	3339	16483	33	57	28837	12354	551
	Maize	31	1166	1246	2663	21	20	2801	138	142
	Lentils	36	1127	1796	3074	65	60	2911	-163	49
	Rice	93	2576	1228	4252	18	20	4492	240	225
	Cereals	62	1867	1296	3501	24	24	3658	157	173
	Vegetables	440	14135	6686	22423	22	36	37091	14668	1048

Costs and returns exhibit variation between crops and between districts. In **Figures 20-23** below, results are disaggregated by district.

Figure 20.

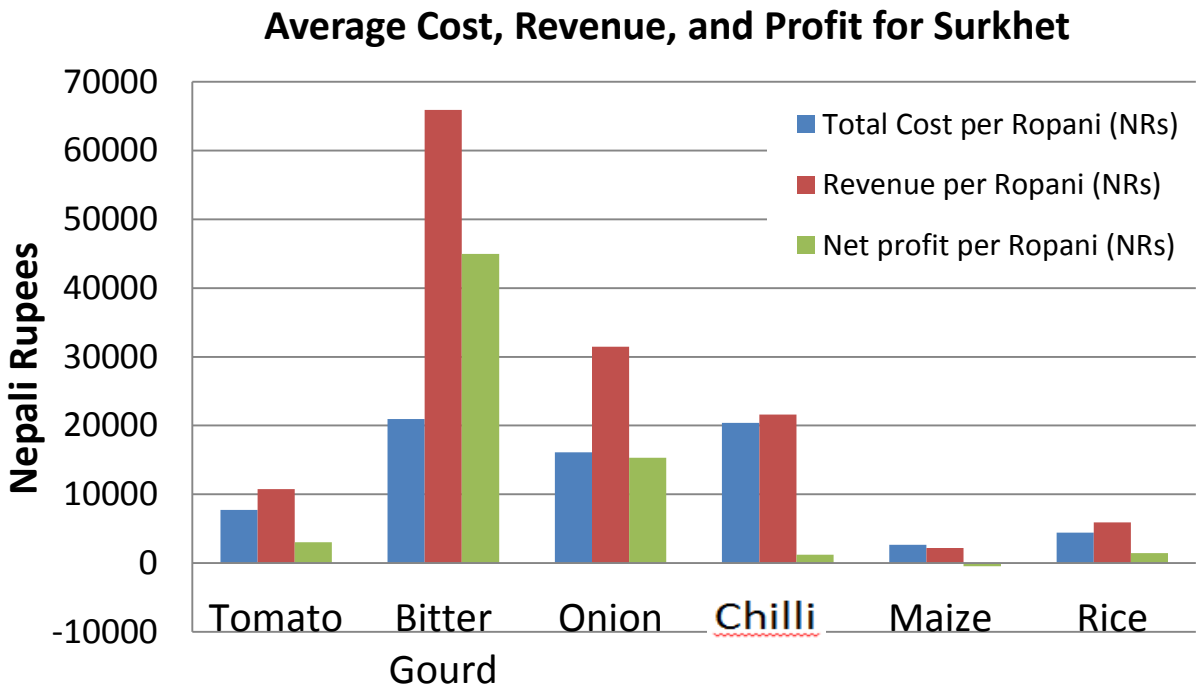


Figure 21.

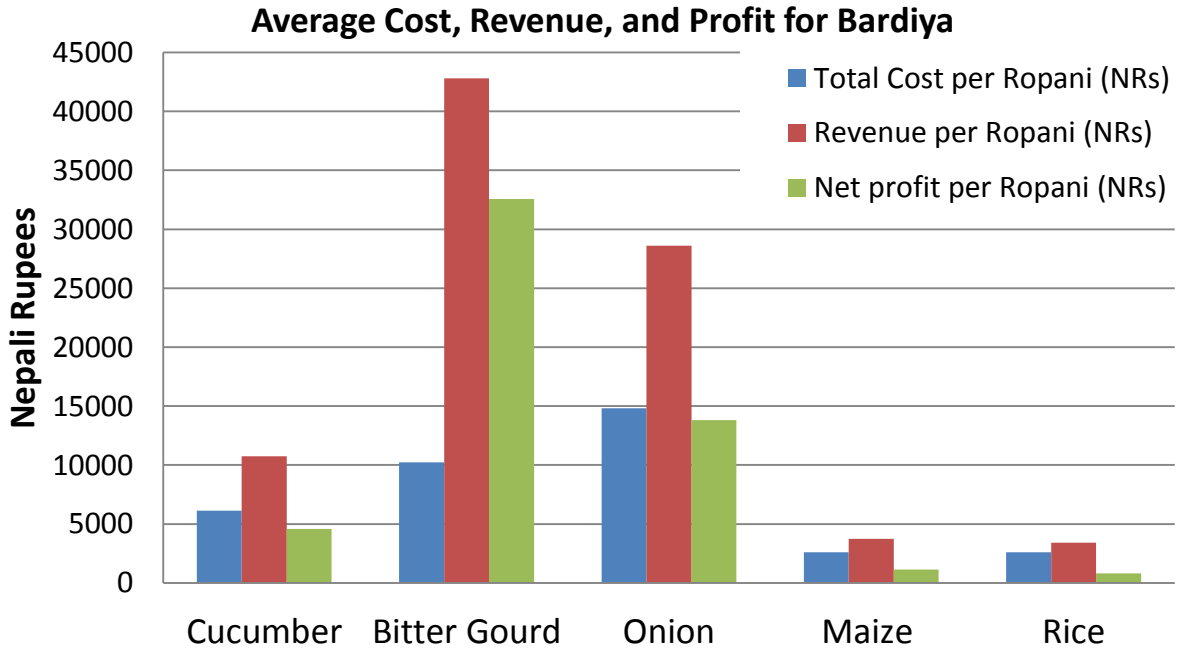


Figure 22.

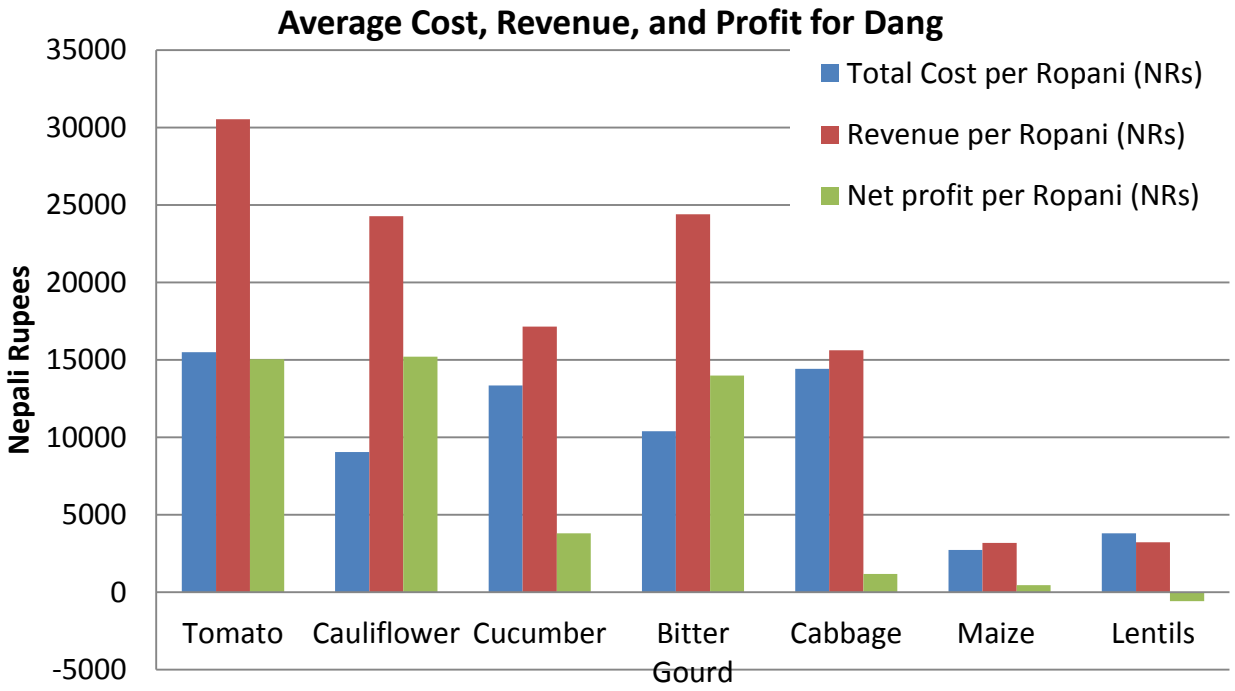
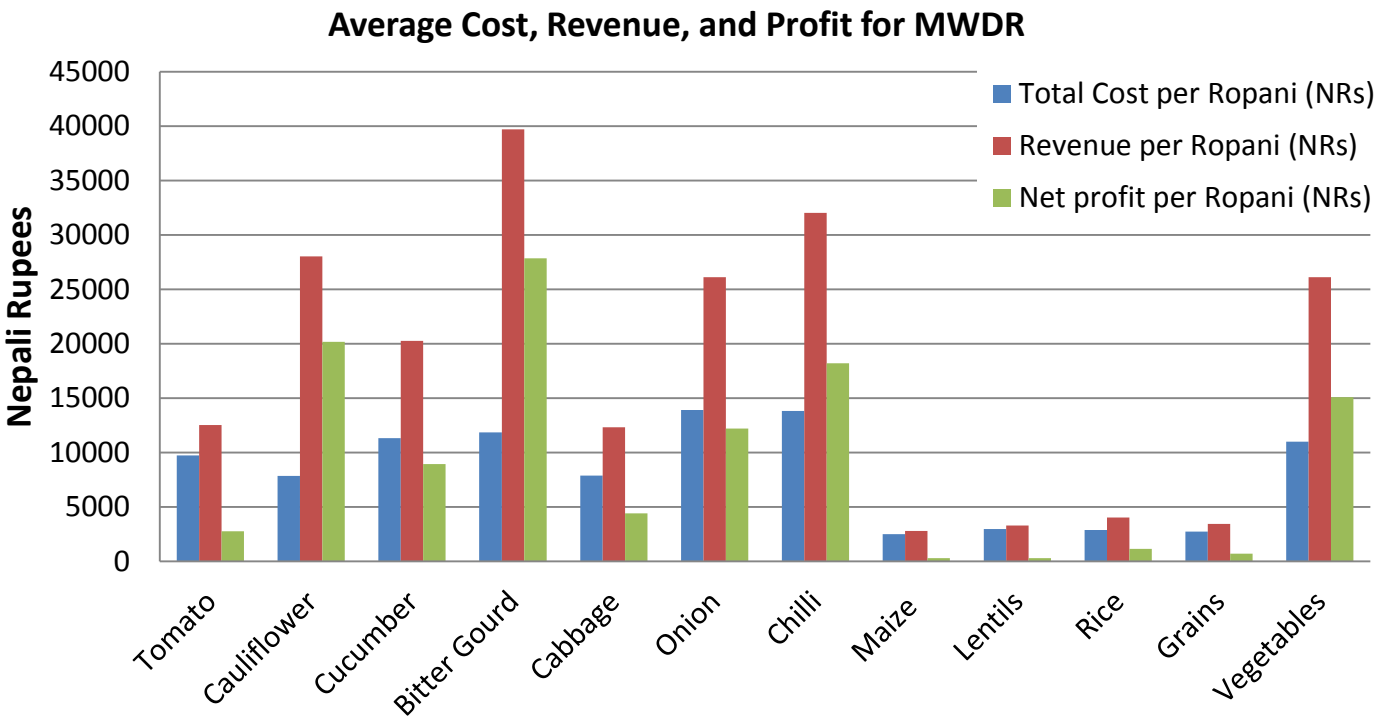


Figure 23.



Costs and returns of individual crops may also be compared across districts as well. **Figures 24-27** display costs and returns for selected crops across the three surveyed districts.

Figure 24.

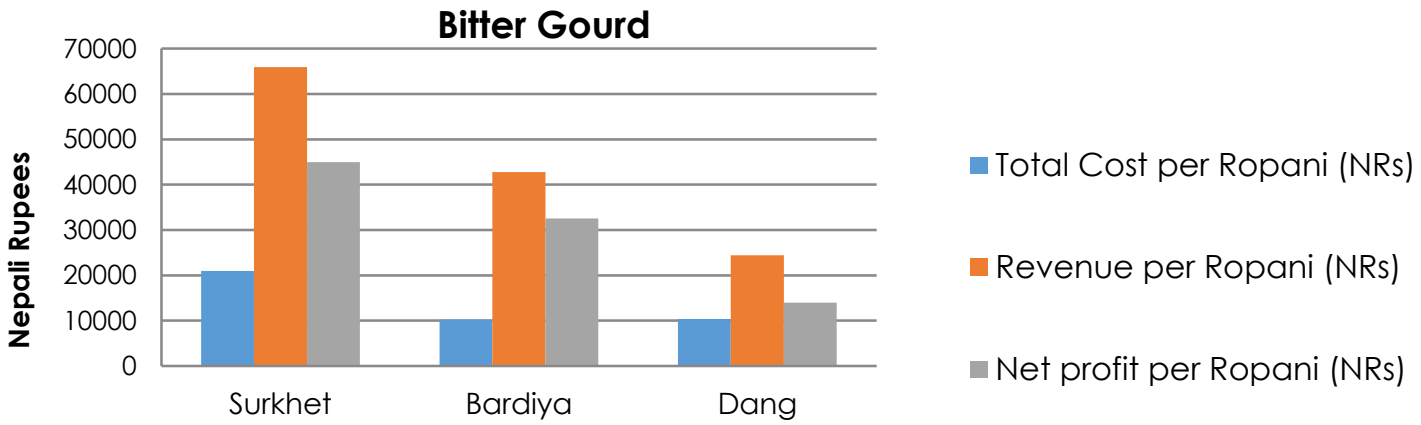


Figure 25.

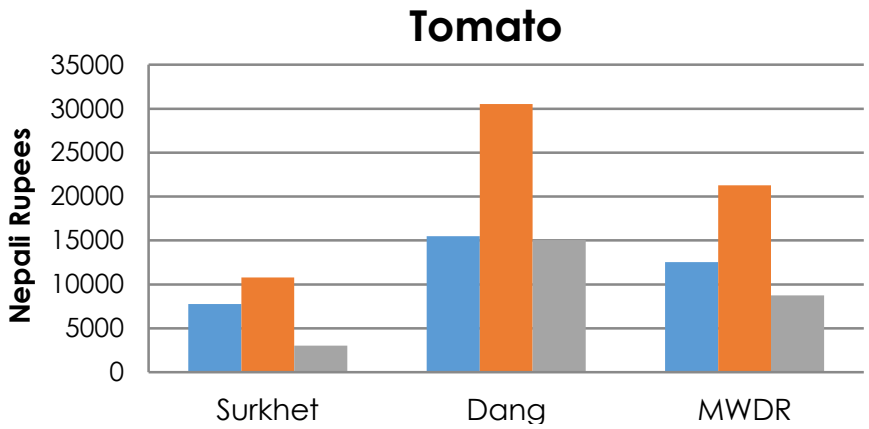


Figure 26.

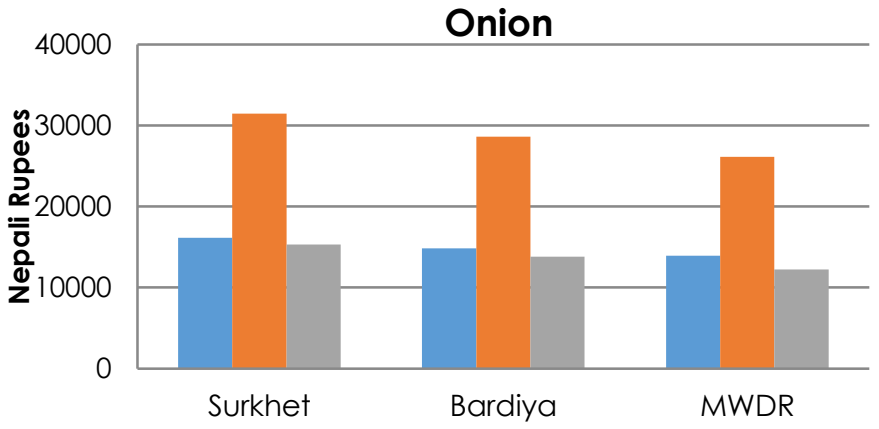
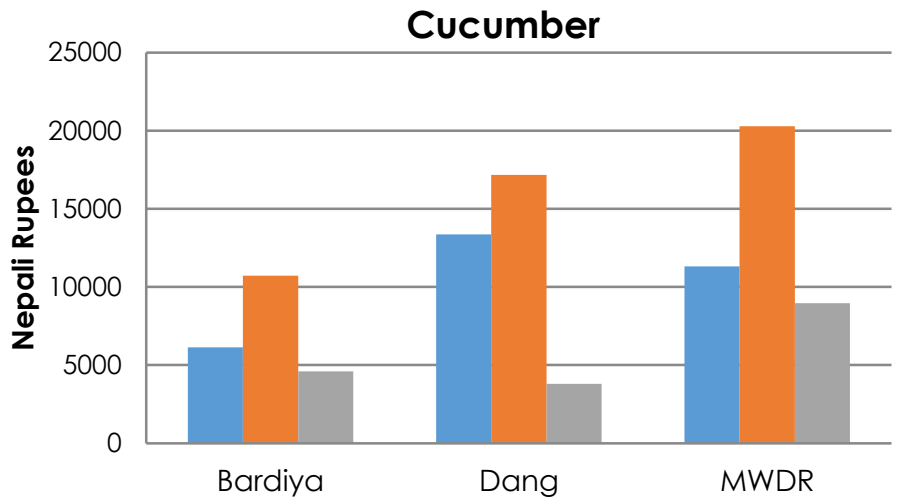


Figure 27.



6.4 Allocation of Results Between Stages of Production

Gross numbers like those presented in Section 6 are useful to farmers and policy-makers when choosing crops, but in everyday practice a more useful dataset would detail the costs incurred for various crops at each stage of the production process. This could be of use if, for instance, a farmer knows she has limited labor availability for planting and wishes to know which crops are more cost-intensive during planting than others.

The data presented in this section decomposes total labor and capital costs into the costs incurred during each stage of the crop production process. The stages include:

- **Land preparation**: Ploughing/tilling of land prior to planting, pre-planting fertilization, as well as the initial construction of any necessary structures such as bamboo houses, drip irrigation, fencing, or irrigation canals.
- **Planting**: The process of transplanting or planting seeds and seedlings
- **Land Maintenance**: All abor and capital inputs that between planting and harvest stages; that is, weeding, watering, fertilizer application, etc.
- **Harvest**: The process of harvesting the crop. This can occur at one time, or at multiple times throughout the growing season.
- **Post-Harvest**: All labor and capital inputs that occur after harvesting. These include storage of the crop and transportation to the point of sale.

The cost values indicated for each stage include both labor and capital costs for that stage. These cost values to not total to the Total Cost value of crop production given in **Section 6** because opportunity costs and cost of credit are not included. These costs cannot be assessed to any specific stage of production. Cost allocation between stages of production are detailed for each district in **Figure 28**. **Figure 29** gives aggregate values for the Mid-Western Development Region as a whole.

Figure 28.

Cost Allocation between Stages of Production (per ropani)											
		Cost of Land Preparation	Cost of Planting	Cost of Land Maintenance	Cost of Harvest	Cost of Post-Harvest	Land Preparation as % of Total Labor and Capital Cost	Planting as % of Total Labor and Capital Cost	Land Maintenance as % of Total Labor and Capital Cost	Harvest as % of Total Labor and Capital Cost	Post-Harvest as % of Total Labor and Capital Cost
Surkhet	Tomato	3154	2111	1987	809	713	38.7	23.8	25.1	7.0	5.3
	Cucumber	34054	6213	30309	4622	5764	37.6	12.9	40.1	4.2	5.2
	Bitter Gourd	18643	7149	28094	9718	4534	24.0	15.4	41.1	12.3	7.1
	Onion	2378	3196	3695	1427	561	20.0	30.0	33.5	11.0	5.5
	Chile	1951	2230	6642	4023	1157	12.5	18.0	43.0	19.9	6.7
	Maize	633	528	1372	242	174	24.2	14.1	46.1	9.0	6.6
	Rice	1005	1319	1259	635	384	22.1	27.1	26.3	15.5	8.9
Bardiya	Cucumber	1342	1134	1985	431	581	17.8	28.2	38.6	6.7	8.8
	Bitter Gourd	3658	1115	2588	2446	453	36.3	14.1	28.0	18.9	2.6
	Onion	2665	3097	2987	2709	2073	18.4	23.3	21.3	19.8	17.3
	Maize	725	269	677	156	392	35.6	11.0	30.5	8.4	14.5
	Rice	839	484	428	337	122	35.9	22.0	18.8	16.5	6.8
Dang	Tomato	4519	1553	4230	771	2803	30.4	11.7	34.9	5.2	17.8
	Cauliflower	2769	1479	2669	582	1142	31.7	16.9	33.4	4.4	13.5
	Cucumber	2789	2302	4610	1451	1430	23.2	17.2	32.1	10.7	16.8
	Bitter Gourd	3625	1346	2291	771	1608	40.5	13.7	23.8	7.8	14.2
	Cabbage	3334	2126	5536	612	622	28.9	16.5	40.1	4.5	9.9
	Maize	935	348	542	182	83	37.7	20.1	26.3	12.0	3.9
	Lentils	1317	217	232	1449	259	37.7	7.8	7.5	38.9	8.2
	Rice	3339	1429	564	1521	281	46.5	17.9	11.5	19.0	5.0

Figure 29.

Cost Allocation between Stages of Production (per ropani)											
		Cost of Land Preparation	Cost of Planting	Cost of Land Maintenance	Cost of Harvest	Cost of Post-Harvest	Land Preparation as % of Total Labor and Capital Cost	Planting as % of Total Labor and Capital Cost	Land Maintenance as % of Total Labor and Capital Cost	Harvest as % of Total Labor and Capital Cost	Post-Harvest as % of Total Labor and Capital Cost
MWDR	Tomato	3213	1828	3223	610	932	33.3	17.5	32.4	5.6	11.2
	Cauliflower	2663	1332	2561	335	806	29.6	20.6	34.7	4.5	10.7
	Cucumber	3438	1488	3309	774	1250	28.3	18.2	37.5	6.7	9.3
	Bitter Gourd	4265	1327	3302	1681	1216	33.9	14.4	30.7	12.3	8.7
	Cabbage	1504	954	2332	162	784	25.2	21.2	40.3	4.5	8.8
	Onion	2623	3057	3478	1953	1290	19.1	27.1	30.3	12.9	10.6
	Chilli	1549	1651	3681	4279	688	11.4	16.5	38.9	24.5	8.8
	Maize	635	244	947	160	193	29.3	14.3	38.9	9.3	8.1
	Lentils	890	265	183	1270	156	27.6	22.3	16.7	26.9	6.6
	Rice	854	556	549	385	186	34.3	22.6	19.4	16.7	7.0
	Grains	762	395	690	364	187	33.0	17.9	25.6	15.9	7.6
	Vegetables	3134	1669	3194	1345	1043	29.8	16.1	33.6	10.3	10.3

6.5 Discussion of Results

Large variation clearly exists in the costs and returns of vegetables within and across districts. Tomato production, for instance, appears much less profitable in Surkhet than in Dang. While some of the variation may be attributable to estimation and sample error, it also holds with the observation that tomato cultivation may be less well suited to a drier, Mid-Hill district such as Surkhet. According to the data presented above, farmers in that district were growing tomatoes in a much less resource intense manner; that is, they were incurring lower costs per ropani, but were reaping fewer returns as well. More intensive tomato cultivation in Dang appears to be more profitable than the less intensive cultivation in Surkhet and Bardiya.

Furthermore, it is clear that Bitter Gourd shows high profitability across all districts. While the costs of cultivation are sometimes higher than those of other crops, returns are invariably higher as well. As a whole, the clearest conclusion from **Figures 20-23** above is that the identification of commercial vegetable crops as "high-value" is indeed an accurate label. **Figure 23** illustrates the notably higher rates of profit earned on vegetable crops in comparison to grain crops such as rice, maize, and lentils. These grain crops, often grown as subsistence crops with very little volume sold, only break even. They involve very few inputs of either labor or capital, but yield low returns as well. Vegetables are more labor and capital intensive, but yield much higher returns. In labor-scarce areas where hiring laborers may not be feasible, expansion of input-intensive vegetables may be limited. Nevertheless**, it appears clear that the KISAN program's objective of promoting "high-value" vegetable crops for commercial sale is a valid one: these crops do indeed result in much higher rates of profit than subsistence grain crops**, even when accounting for the costs of unpaid labor and opportunity cost.

Comparing the costs and returns of individual crops across districts highlights more clearly that tomato cultivation appears both less resource-intensive and less profitable in Surkhet than in Bardiya or Dang. In contrast, cucumbers, bitter gourd, and onions all appear more input-intensive and more profitable in Surkhet. The data presented above may be employed to make similar analyses and conclusions regarding any of the other surveyed crops.

The data presented in **Figures 28 and 29** shows the distribution of costs between different stages of the crop production process. By and large, most crops exhibit relatively similar cost allocations between stages of production, and the differences exhibited between crops are small enough to feasibly be the result of estimation and sample error. Nevertheless, cost breakdowns for individual crops are still useful to farmers in that they

may assist farmers in understanding expected costs for each stage of the production process.

7. Principal Challenges to Production

The survey included a question in which farmers reported the principal challenges they faced in their agricultural practice. The results of the survey are presented below. Farmers could one or two challenges, so the total number reported below sums to more than the total number of farmers surveyed.

Figure 30.

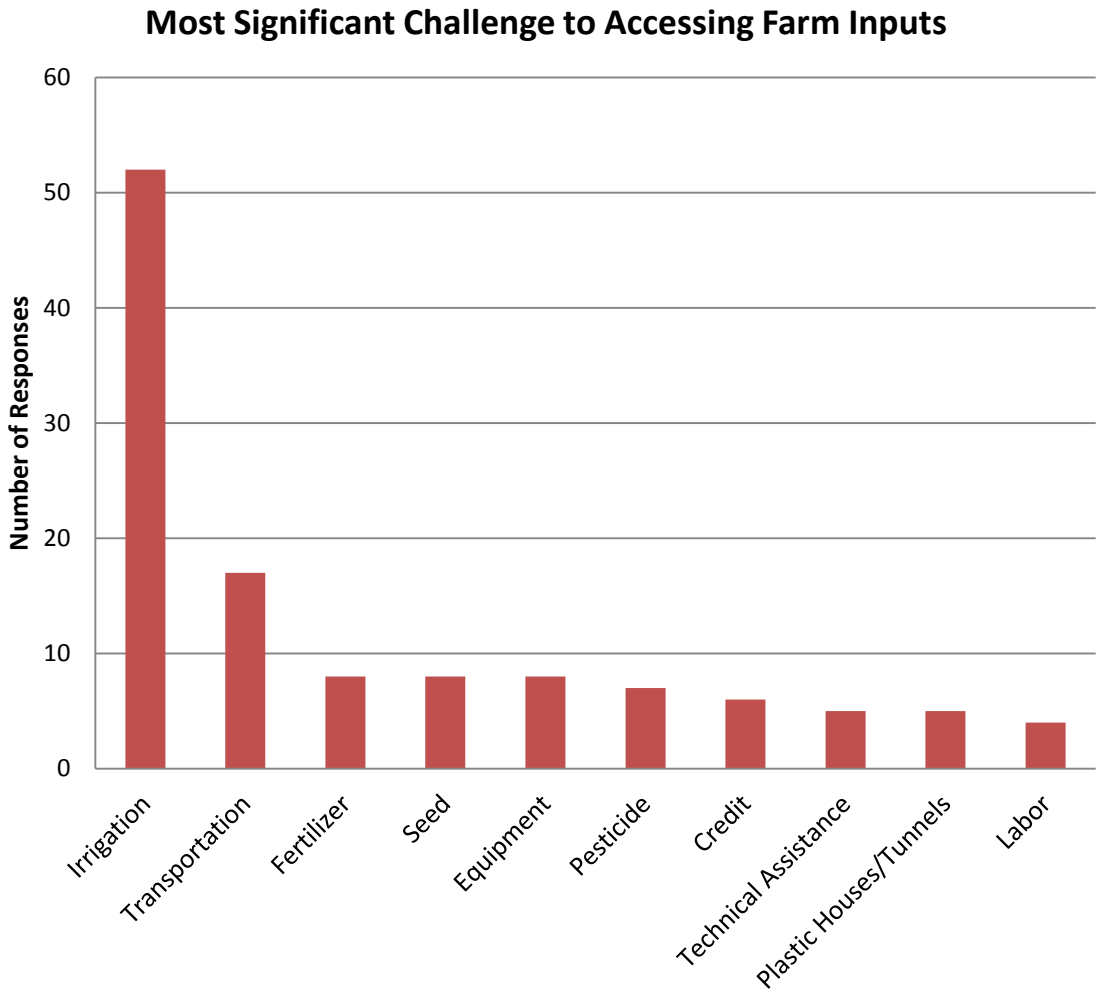


Figure 30 clearly highlights the importance of **irrigation** to subsistence and commercial farmers in the Mid-Western Development Region. Over 50 of the 83 survey participants reported irrigation as the principal challenge to their farming practice. Many cited lack of motor pumps or irrigation canals as their principal problem. Most agriculture in the region remains rain fed, and thus subject to drastic season and annual variations and

victim to drought. Motor pumps or drip irrigation would allow farmers to more confidently expand into commercial crop production by lowering the levels of uncertainty which incentive reliance on subsistence crops such as rice and maize.

A further 17 farmers cited **transportation** as their principal challenge. Many of these farmers had begun practicing commercial agriculture, but had no means of transporting their good to market for sale. This limited their ability to expand their commercial practice. Other farmers had chosen not to move into commercial vegetable production because of the lack of transportation opportunities.

Eight farmers cited **fertilizer** as their principal challenge. Some of these farmers were referring to their inexperience and confusion with using new chemical fertilizers and jhol mol. They were hesitant to adopt the new and untested techniques. Others simply reported that their crops required more intensive fertilizer inputs than they were able to provide.

Other farmers (8) reported that obtaining commercial **seeds** was a challenge to their high-value vegetable production. They cited high seed prices and long distances to an agrovet as limiting factors in their production. Others expressed confusion over the varieties of improved and local seeds or noted their need for improved seed varieties.

Farmers citing **equipment** as a principal challenge (8) often spoke of the need for tractors or other mechanized inputs that were difficult to access in their villages. Many villages did not have a rental market for tractors, tillers, or threshers.

Farmers citing **pesticide** as a challenge were often facing severe pest problems, and did not have access to the pesticides or Integrated Pest Management techniques necessary to resolve these issues.

The six farmers reporting challenges in obtaining **credit** reported that they had no access to a loan and desired a loan to expand or improve their agricultural practice or to purchase a key mechanized or technical input.

The five farmers citing **technical assistance** reported that they needed more trainings, whether from KISAN or partner organizations, in order to successfully implement improved production and post-production techniques and move into commercialized vegetable production.

The five farmers citing **plastic houses/tunnels** as a challenge desired to build these structures for their vegetable plots, but lacked the inputs, or more often, the technical know-how to build these structures.

The four farmers reporting **labor** as a principal challenge remarked that they desired more labor for their farms and wished to hire laborers, but were unable to afford these hires, or more often, lacked an accessible market for labor in their village.

8. Conclusion

The results presented in this report offer a panoramic understanding of variations in costs and returns of production for a range of crops across the Mid-Western Development Region. Variation in costs and returns can be capitalized upon by cultivating the most cost-effective crops in each district.

The results presented above suggest that vegetable crops are indeed more profitable than grain crops. While variation exists between different vegetable crops and different regions, all high-value vegetables are on average more profitable than grains. Vegetables also appear to be more labor intensive than grain crops. This is largely because they require much higher levels of individualized care, weeding, watering, pollination, harvest, etc. While vegetables are more input-intensive than grains, they result in higher returns as well. Thus, in regions with surplus labor, vegetable cultivation would be an excellent way to absorb labor and produce higher returns. However, limited labor supplies may limit the expansion of vegetable cultivation.

One important point to highlight in regard to this report is that many farmers reported data from the season before they began implementing the improved KISAN techniques. Thus, the reported data do not reflect the results of using improved KISAN techniques, and should instead be treated as baseline data. Factors showed a high degree of response to KISAN trainings; that is, once they had attended a training, they very quickly worked to implement the newly-learned technique on their own farm. However, during this first KISAN season, many farmers had already planted their fields when they attended the trainings, and were thus unable to immediately implement the improved techniques. Again, this suggests that the data presented in this report should be treated as baseline data instead of as a reflection on the success of the KISAN project.

A fuller costs and returns of production survey should be conducted in approximately six months' time in order to more accurately assess costs and returns to production across the Mid-Western Development region. Results from that survey may then be compared to the baseline results presented in this report to gain a fuller understanding of the impact of the KISAN program on costs and returns to production in the region.

9. Detailed Cost and Return Tables by Crop

Average Costs and Returns to Production per Hectare for MWDR[16]

Crop: Tomato Year: 2014

Cost/Return	Unit	Quantity	Price (NRs)	Value (NRs)
Human Labor	Day	400	330	112,262
Plough Animal	Day	8.55	800	6,859
Tractor/Tiller	Day	0	NA	0
Pump	Unit	0 to 1	5,000	0 to 2,500
Pesticide	kg.	19	184	3,496
Jhol Mol/Manure	doka	418	45	18,563
Chem. Fertilizer	kg.	38	100	3800
Seed	kg.	12.35	250	7,315
Total Cost (per hectare)	NR			191,464
Total Cost (per kg.)	NR			21
Revenue	NR			246,167
Net Profit	NR			54,702

Crop: Cauliflower Year: 2014

Cost/Return	Unit	Quantity	Price	Value (NRs)
Human Labor	Day	273	330	80,446
Plough Animal	Day	19	500	9,500
Tractor/Tiller	Day	19	300	5,700
Pump	Unit	0 to 1	5000	0 to 2,500
Pesticide	kg.	44.65	250	11,172
Jhol Mol/Manure	doka	456	50	22,743
Chem. Fertilizer	kg.	182	125	22,762
Seed	kg.	53	350	18,677
Total Cost (per hectare)	NR			154,252
Total Cost (per kg.)	NR			11.8
Revenue	NR			550,775
Net Profit	NR			396,523

[16] Calculated from Survey of Costs and Returns of Production in Mid-Western Development Region, conducted between June and July, 2014. All reported values are averages for the districts of Surkhet, Bardiya, and Dang.

Crop: Cucumber Year: 2014

Cost/Return	Unit	Quantity	Price	Value (NRs)
Human Labor	Day	469	325	121,198
Plough Animal	Day	10.6	900	9,652
Tractor/Tiller	Day	0	NA	0
Pump		0 to 1	4,500	0 to 2,500
Pesticide	kg.	76	155	11,780
Jhol Mol/Manure	doka	665	40	26,410
Chem. Fertilizer	kg.	38	96	3,629
Seed	kg.	91	320	29032
Total Cost (per hectare)	NR			222,548
Total Cost (per kg.)	NR			19.8
Revenue	NR			398,563
Net Profit	NR			176,014

Crop: Bitter Gourd Year: 2014

Cost/Return	Unit	Quantity	Price	Value (NRs)
Human Labor	Day	562	315	136,861
Plough Animal	Day	5.13	800	4,085
Tractor/Tiller	Day	0 to 1	2500	2,000
Pump		0 to 1	3000	0 to 2,500
Pesticide	kg.	57	89	5,092
Jhol Mol/Manure	doka	238	50	11,875
Chem. Fertilizer	kg.	19	81	1,539
Seed	kg.	1.2	260	6,080
Total Cost (per hectare	NR			233,264
Total Cost (per kg.)	NR			15
Revenue	NR			780,484
Net Profit	NR			547,219

Crop: Cabbage Year: 2014

Cost/Return	Unit	Quantity	Price	Value (NRs)
Human Labor	Day	249	325	61,804
Plough Animal	Day	6.3	600	3,800
Tractor/Tiller	Day	0	NA	0
Pump		0 to 1	600	0 to 2,500
Pesticide	kg.	19	225	4,275
Jhol Mol/Manure	doka	209	50	10,450
Chem. Fertilizer	kg.	46	100	4,598
Seed	kg.	38	200	7,600
Total Cost (per hectare)	NR			155,254
Total Cost (per kg.)	NR			17.7
Revenue	NR			242,058
Net Profit	NR			86,804

Crop: Onion Year: 2014

Cost/Return	Unit	Quantity	Price	Value (NRs)
Human Labor	Day	723	300	189,400
Plough Animal	Day	26.2	500	13,110
Tractor/Tiller	Day	0	NA	0
Pump		0 to 1	3000	0 to 2,500
Pesticide	kg.	35.15	150	5,282
Jhol Mol/Manure	doka	1229	33	40,584
Chem. Fertilizer	kg.	68.21	110	7,505
Seed	kg.	151	250	37,924
Total Cost (per hectare)	NR			273,314
Total Cost (per kg.)	NR			29
Revenue	NR			513,379
Net Profit	NR			240,064

Crop: Chilli Year: 2014

Cost/Return	Unit	Quantity	Price	Value (NRs)
Human Labor	Day	772	300	179,151
Plough Animal	Day	10.8	800	8,075
Tractor/Tiller	Day	0	NA	0
Pump		0 to 1	5,000	0 to 2500
Pesticide	kg.	114	200	22800
Jhol Mol/Manure	doka	744	33	24548
Chem. Fertilizer	kg.	19	100	1900
Seed	kg.	24	300	7125
Total Cost (per hectare)	NR			271,987
Total Cost (per kg.)	NR			23.8
Revenue	NR			629,704
Net Profit	NR			357,717

Crop: Maize Year: 2014

Cost/Return	Unit	Quantity	Price	Value (NRs)
Human Labor	Day	772	300	179,151
Plough Animal	Day	3.2	800	2590.5
Tractor/Tiller	Day	1.65	NA	2946.9
Pump		0 to 1	5,000	0 to 2,500
Pesticide	kg.	1.65	200	165
Jhol Mol/Manure	doka	335	33	13,398
Chem. Fertilizer	kg.	9.6	100	1,205
Seed	kg.	3.83	300	1,147
Total Cost (per hectare)	NR			49,123
Total Cost (per kg.)	NR			20
Revenue	NR			55,289
Net Profit	NR			6,166

Crop: Lentils Year: 2014

Cost/Return	Unit	Quantity	Price	Value (NRs)
Human Labor	Day	772	300	179,151
Plough Animal	Day	0.825	800	495
Tractor/Tiller	Day	0.4	NA	990
Pump		0 to 1	5,000	0 to 2,500
Pesticide	kg.	0	200	0
Jhol Mol/Manure	doka	71	33	2,475
Chem. Fertilizer	kg.	0	100	0
Seed	kg.	20.625	300	1,238
Total Cost (per hectare)	NR			58,571
Total Cost (per kg.)	NR			51.5
Revenue	NR			64,816
Net Profit	NR			6,245

Crop: Rice Year: 2014

Cost/Return	Unit	Quantity	Price	Value (NRs)
Human Labor	Day	772	300	179,151
Plough Animal	Day	12.3	800	9,869
Tractor/Tiller	Day	1.5	NA	3,269
Pump		0 to 1	5,000	0 to 2,500
Pesticide	kg.	1.65	200	222.75
Jhol Mol/Manure	doka	219.5	33	10,956
Chem. Fertilizer	kg.	50.7	100	5,572.05
Seed	kg.	25	300	2,487
Total Cost (per hectare)	NR			57,019
Total Cost (per kg.)	NR			15
Revenue	NR			79,532
Net Profit	NR			22,513

10. Survey Appendices

Questionnaire to Estimate Costs of Production (English)

0. General Information

0.1 Date:_____
0.2 Form #:_____
0.3 District:_____
0.4 VDC:_____
0.5 Ward:_____
0.6 Village:_____
0.7 Group Name/#:_____

1. Personal Information

1.1 Name of Respondent:_____
1.2 Age:_____
1.3 Gender:

- □ Male
- □ Female

1.4. Number of Family Members:_____

1.5 Respondent's Position in Group: (Check One)

- □ Chairperson
- □ Secretary
- □ Member
- □ Other:_____

1.5 Education:

- □ Illiterate
- □ Informal (Adult Literacy)
- □ Primary (1-5)
- □ Secondary (6-10)
- □ SLC
- □ Higher

1.6 Ethnicity:

- □ Brahmin
- □ Chhetri
- □ Janajati
- □ Dalit
- □ Other:_____

1.7 Which KISAN trainings or demonstrations have you attended?

- Plastic Houses/Drip Irrigation
- Planting Techniques
- Storage Technologies
- Seed Varieties
- Chemical Fertilizer
- Livestock
- Jhol-Mol
- Pest Management (IPM)
- Rhizobium Culture

2. Socioeconomic Status

2.1 Primary Source of Income:

- Grain Crops
- High Value Vegetables
- Livestock
- Tourism/Business
- Business
- Government service
- Non-Timber Forest Products
- Other: _____

2.2 Assets (Check all that apply):

- Cellphone
- Radio
- TV
- Electricity
- Motorcycle
- Bicycle
- Bullock Cart
- Truck/Tractor
- Livestock
- Poultry
- Agro. Machinery
  - Pump
  - Tiller
  - Thresher
  - _____
- Gas Stove
- Multiple Water Use System (MUS)
- Solar Home System (SHS)
- Biogas

2.3 Distance to nearest road:_____

2.4 Distance to nearest Market:_____

2.5 What is the source of wateryou're your farm:_____

2.6 Services Accessible:

2.6.1 Is there an Agrovet supplier near your farm?

- Yes
- No

If yes,

2.6.2 How long does it take to get to Agrovet supplier:

- Walking _____
- Bus/vehicle _____

2.6.3 What services are available there?

- Pump
- Drip Hoses(pipe)
- Sprayers
- Seed
- Fertilizer
- Pesticide
- Water Storage Tanks

2.6.4 Are any other services available near your farm?

- Agricultural Extension Services
  - Government Services
  - Non-Government Services
- Agro. Machinery
  - Tractor
  - Tiller
  - Thresher

3. Land

3.1 Land Ownership Status:

- Farming on their own land
- Leasing land
  - If leasing: Cost of lease:_____
  - Lease Period:_____

3.2 What is the area of the farm? (Specify Kattha/Ropani):_____

3.3 What type of farming is practiced?

- □ Subsistence
- □ Commercial

3.4 Is your annual farm income and your food production enough to last your family:

- □ For 3 – 6 months
- □ For 6 - 9 months
- □ For 9 – 12 months
- □ More than 1 year

3.5 Crops in Production:

Crops in Production:	Area of production (specify units)	Yield (kg.)	Yield in Previous Season (kg.)	Volume sold (kg.)	Sale price (per kg.)	# of Plantings per Year
Tomatoes						
Cauliflower						
Cucumber						
Bitter Gourd						
Cabbage						
Onion						
Chili						
Maize						
Lentils						
Rice						
Other:_____						

4. Investment/Expenditure

4.1 Labor Investment/Expenditure

	Family and Unpaid Neighbor's Labor			Hired Labor					
				Male Workers			Female Workers		
	# of Workers	# of Days Worked	Hours Worked per day	# of Workers	# of Days Worked	Wage (+lunch)	# of Workers	# of Days Worked	Wage (+lunch)
Land Preparation: (getting materials/ seeds, ploughing, fertilizer, pipes, building, etc.)									
Planting									
Maintenance (weeding, watering, upkeep, fertilizing, pest mgmt.)									
Harvest									
Storage									
Transportation									

4.2 Capital Investment/Expenditure

1st Crop:

Type of crop (circle one):	Tomatoes	Lentils						
	Cauliflower	Rice						
	Bitter Gourd	Onion						
	Cucumber	Chili						
	Cabbage	Other:_____						
	Maize							
Capital Good:		**Owned (✓)**	**Rented (✓)**	**Service provider**	**Service Provider's Dist. From Farm (km.)**	**Unit**	**Cost (per unit)**	**Duration of Use**
Tools/Machinery:								
	Tractor							
	Tiller							
	Thresher							
Plough Animal								
Irrigation:								
	Pumps							
	Tanks							
	Drip Hoses							
	Sprinklers							
Pesticide:								
Fertilizer:								
	Jhol Mol/Manure							
	Chemical							
Seed								
Technical Assistance								
Transportation								
Other Inputs:								
	Fence							
	String							
	Plastic Houses							
	Planting Trays							
	Coconut Peat							
	Buildings							
Other:								

2nd Crop:

Type of crop (circle one):	Tomatoes	Lentils						
	Cauliflower	Rice						
	Bitter Gourd	Onion						
	Cucumber	Chili						
	Cabbage	Other:_____						
	Maize							
Capital Good:		**Owned (✓)**	**Rented (✓)**	**Service provider**	**Service Provider's Dist. From Farm (km.)**	**Unit**	**Cost (per unit)**	**Duration of Use**
Tools/Machinery:								
	Tractor							
	Tiller							
	Thresher							
Plough Animal								
Irrigation:								
	Pumps							
	Tanks							
	Drip Hoses							
	Sprinklers							
Pesticide:								
Fertilizer:								
	Jhol Mol/Manure							
	Chemical							
Seed								
Technical Assistance								
Transportation								
Other Inputs:								
	Fence							
	String							
	Plastic Houses							
	Planting Trays							
	Coconut Peat							
	Buildings							
Other:								

5 Challenges to Accessing Inputs:

5.2 From the following list, identify which are the most important to the farmer (check up to three) and comment on what the challenges are for those inputs:

Irrigation:_____

Pesticide:_____

Fertilizer:_____

Seed:_____

Equipment:_____

Technical Assistance:_____

Transportation:_____

Structures:_____

Other:_____

6 Estimating Total Investment and Revenue:

6.1 (Identify Units)

Estimated total investment per crop:		**Estimated Total Invesment**	**Estimated Total Income**
	Tomatoes		
	Cauliflower		
	Cucumber		
	Bitter Gourd		
	Cabbage		
	Maize		
	Lentils		
	Rice		
	Onion		
	Chili		

7 Credit:

7.2 Are you a member of any formal or informal groups?

- Yes
- No

7.1.1 If yes, which groups?

- Forest Users' Group
- Water Users' Group
- Savings & Loan Group
- Other (NGO)

7.1.2 What services do you get from this group?

_____
____

7.2 Do you currently have a loan?

- Yes
- No

If yes:

7.2.1 What type of loan is it?_____

7.2.2 What is the amount of the loan?_____

7.2.3 What is the interest rate of the loan?_____

7.2.4 What is the status of the loan?_____

Questionnaire to Estimate Costs of Production (Nepali)

साना किसान खेती उत्पाद लागत अध्ययन प्रश्नावली

मध्य -पश्चिमाञ्चल बिकास क्षेत्र

०.सामान्य जानकारी

१. मिति:_____
२. फार्म नं :_____
३. जिल्ला :_____
४. गा.वि.स : _____
५. वडा नं:_____
६. गाँउ:_____
७. समुहको नाम :_____

१. ब्यक्तिगत जानकारी

१.१ उत्तर कर्ताको नाम:_____

१.२ उमेर:_____

१.३ लिंग

☐ पुरुष ☐ महिला

१.४ कुल परिवार संख्या :_____

१ .५ उत्तर कर्ताको समुहमा पद:

☐ अध्यक्ष ☐ सदस्य
☐ सचिव ☐ अन्य _____

१.५: शिक्षा

☐ निरक्षर
☐ अनौपचारिक (प्रौढ शिक्षा)
☐ प्राथमिक (१-५)
☐ माध्यमिक (६-१०)
☐ एस.एल.सी
☐ उच्च शिक्षा

१.६: जात:

☐ ब्राहमण
☐ क्षेत्री
☐ जनजाती
☐ दलित
☐ अन्य _____

१.७: के तपाईले कुनै KISAN तालिम वा प्रदशेनमा भाग लिनुभएको छ?

- ☐ प्लास्टिक घर / थोपा सिंचाई
- ☐ रोपाइ प्रविधी
- ☐ भण्डार / थन्क्याउने प्रविधी
- ☐ बीउका प्रकार
- ☐ रासायनीक मल
- ☐ पशु पालन
- ☐ झोल मोल
- ☐ एकीकृत शत्रुजीव व्यवस्थापन (IPM)
- ☐ राइजोबियम पद्धती

२ .सामाजिक आर्थिक विवरण

२.१ प्राथमिक आम्दानीको स्रोत :

- ☐ अन्न वाली
- ☐ उच्च मुल्य तरकारी खेती
- ☐ पशु पालन
- ☐ पर्यटन
- ☐ सरकारी जागिर
- ☐ ब्यापार
- ☐ गैर काष्ठ उत्पादन
- ☐ अन्य: _____

२.२:सम्पत्ति:

- ☐ मोवाईल
- ☐ साईकल
- ☐ रेडियो
- ☐ टि.भी
- ☐ विजुली बत्ती
- ☐ मोटर साइकल
- ☐ गाढा
- ☐ ट्रक / टेक्टर
- ☐ पशुपालन
- ☐ कुखुरा पालन
- ☐ कृषी औजार / मेशीन
  - ○ पम्प
  - ○ टीलर
  - ○ थ्रेसर
  - ○ _____
- ☐ ग्याँस चुलो
- ☐ बहु उद्देश्यीय सिंचाइ प्रणली (MUS)
- ☐ सोलार घरेलु प्रणली (SHS)
- ☐ बायो ग्याँस

२.३ नजिकको बाटोको दुरी: _____

२.४ नजिको हाटबजार/बजारको दुरी: _____

२.५ खेतीको लागी पानिको स्रोत :_____

२.६ उपलब्ध सेवाहरु :

२.६.१ के तपाईको नजीकै कृषी सामाग्री विक्रेता (एग्रोभेट) छ?

☐ छ

☐ छैन

एदि छ भने,

२.६.२ त्यहाँ पुग्न लाग्ने समय :

☐ पैदल _____

☐ बस / गाडी _____

२.६.३ कुन कृषी सामाग्री पाइन्छ ?

- ○ पम्प
- ○ ड्रिप (पाइम)
- ○ स्प्रेयर
- ○ बीउ
- ○ मल
- ○ बिषादि
- ○ पानी ट्याङ्क

२.६.४: अरु कुनै सेवा पाईन्छ ?

☐ कृषी प्रसार सेवा

- ○ सरकारी सेवा
- ○ गैर सरकारी सेवा

☐ कृषी औजार / मेशीन

- ○ ट्रेक्टर
- ○ टीलर
- ○ थ्रेसर
- ○ _____

३. जमिन

३.१जमिनको अधिप्रहण स्थिति :

- ☐ निजि
- ☐ ठेकाबन्धक / भाडा
  - ○ भडाको लागत :_____
  - ○ ठेकाको अवधि :_____

३.२ जमिनको क्षेत्रफल (रोपनी/कट्ठा :_____

३.३ खेती कुन किसिमको हो ?

- ☐ निर्वाहमुखी
- ☐ ब्यवसायिक

३.४ खेतीको उत्पादन ,खपत र बिक्रिले तपाँइको परिवरलाई कति महिना पुग्छ ?

- ☐ ३ -६ महिना
- ☐ ६-९ महिना
- ☐ ९-१२ महिना
- ☐ १ वर्ष भन्दा बढी

३.५ उतपादन हुने बालिहरु:

बालीको नाम	क्षेत्रफल (रोपनी /कट्ठा)	उत्पादन (के.जी)	गत बालिको उत्पादन (के .जी)	बिक्रि मात्रा (के.जी)	बिक्रिदर प्रति (के.जी)	बर्षमा कति पटक बाली लगाउनु हुन्छ ?
गोलभेडा						
काउली						
काँक्रो						
करेला						
बन्दा						
प्याज						
खुर्सानी						
मकै						
दाल/दलहन						
धन						
अन्य						

४. लागत

४.१ जनशक्ति लाग

	परिवार र छिमेकी जनशसक्ति			भाडा र किराया जनशक्ति					
				पुरुष			महिला		
	सँख्या	जन श्रमको दिन	प्रति दिन गर्ने काम (घण्टामा)	सँख्या	जन श्रमको दिन	ज्याला+ (खाजा खर्च)	सँख्या	जन श्रमको दिन	ज्याला+ (खाजा खर्च)
जमीनको तयारी(सामान /बीउ ओसार्ने, जोत्ने, सम्याउने, मल हाल्ने आदि)									
रोपाँई (छर्ने, रोप्ने सिंचाई)									
हेरचाह गर्ने(झार उखेल्ने, पानि हाल्ने,रेखदेख गर्ने,मल र विषादिको प्रयोग आदि)									
बाली काट्ने									
भण्डार/थन्क्याउने									
ढुवानी									

४.२: पुँजीगत लगत

पहिलो बाली

बालीको नाम (एक चिन्ह लगाउनु)	गोलभेडा	काउली	काँक्रो	करेला	बन्दा	प्याज	खुर्सानी	
	मकै	दाल/दलहन	धन					
	अन्य							
		निजि	भाडामा	सेवाप्रधान गर्ने व्यक्ति / सँस्था	सेवा प्रधान गर्नेको दुरी (कि.मी.)	परिमाण	लागत प्रति	प्रयोग गरेको अवधि
औजार ,मेशिन								
	ट्रेक्टर							
	टीलर							
	थ्रेसर							
जोत्ने वस्तुभाउ								
सिँचाई								
	पम्प							
	ट्याङ्क							
	ड्रिप, पाईप							
	स्प्रिंकलर							
विसादि								
मल								
	झोल मोल /गोवर							
	रासायनीक							
बीउ								
प्राबिधिक सहयोग								
ढुवानी								
अन्य लागत								
	बार							
	तार /डोरी							
	प्लास्टिक घर							
	बेर्ना सार्ने भाडा							
	नरिवल पीट							
	भवन							
अन्य								

दोस्रो बाली

बालीको नाम (एक चिन्ह लगाउनु)	गोलभेडा	काउली	काँक्रो	करेला	बन्दा	प्याज	खुर्सानी	
	मकै	दाल/दलहन	धन					
	अन्य							
		निजि	भाडामा	सेवाप्रधान गर्ने व्यक्ति / सँस्था	सेवा प्रधान गर्नेको दुरी (कि.मी.)	परिमाण	लागत प्रति	प्रयोग गरेको अवधि
औजार ,मेशिन								
	ट्रेक्टर							
	टीलर							
	थ्रेसर							
जोत्ने बस्तुभाउ								
सिँचाई								
	पम्प							
	ट्याङ्क							
	ड्रिप, पाईप							
	स्प्रिंकलर							
विसादि								
मल								
	झोल मोल /गोवर							
	रासायनीक							
बीउ								
प्राविधिक सहयोग								
ढुवानी								
अन्य लागत								
	बार							
	तार /डोरी							
	प्लास्टिक घर							
	बेर्ना सार्ने भाडा							
	नरिवल पीट							
	भवन							
अन्य								

५.कृषी लागत प्राप्त गर्न लाग्ने चुनौतीहरु:

५.१ सुचिबाट मुख्य कृषी लागतहरुमा टिप्णी दिनुहोस् :

सचाँई:_____

बिषादि:_____

मल :_____

बीउ:_____

उपकरण:_____

प्राबिधिक सहयोग :_____

ढुवानी /यातायात :_____

भौतिक संरचना :_____

अन्य :_____

६. अनुमानित कुल लगानी र आम्दानी :

बलीको नाम	अनुमानित कुल लगानी	अनुमानित कुल आम्दानी
गोलभेडा		
काउली		
काँक्रो		
करेला		
बन्दा		
प्याज		
खुर्सानी		
मकै		
दाल/दलहन		
धन		
अन्य		

७. कर्जा

७.१. के तपाई कुनै औपचारीक वा अनौपचारीक समुहमा संलग्न हुनु हुन्छ ?

☐ छ

☐ छैन

यदि छ भने,

७.१.१ कुन समुह?

☐ वन उपभोक्ता समुह

☐ पानि उपभोक्त समुह

☐ बचत तथा समुह

☐ अन्य (गैर सरकारी संस्था)

७.१.२ तपाईले के कस्तो सेवा / अनुदान प्राप्त गर्नु हुन्छ ?

_____

_____

७.२ के तपाँईले हाल कुनै ऋण लिनुभएको छ ?

☐ छ

☐ छैन

इदि छ भने :

७.२.१ कुन प्रकारको ऋण हो ? _____

७.२.२ ऋणको रकम कति छ ?_____

७.२.३ ऋणको ब्याजदर कति छ ?_____

७.२.४ ऋणको अवश्था(कति तिरेको र तिर्न बाँकी) कस्तो छ ?

_____

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